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Table of Contents

Vol. 40, No. 50 — April 23, 1942

News Developments

Trends: Earnings Reports for First Quarter Reveal High Operating Costs 19
Extensive Pipe-Line Plans Designed to Relieve East ..... *H. Stanley Norman* 20
This Week 21
California Gas Line to Be Converted to Crude Service 21
Power of Review Granted in District 5 M-68 Rejections 22
Oil Industry Moving Rapidly Along Several Fronts ..... *C. O. Willson* 23
States Are Urged to Observe OPC's Production Quota 25
News From the State Capitals 26
Editorial: A Job for Explorers 27
Revocation of P-83 Forces Suppliers to Use Form PD-1X 28
Treasury Launches Attack on Depletion Allowance 28
Oil Companies Study Proposal for Settlement With Mexico 30
Eastern Rail Shipments Average 586,325 Bbl. Daily 30
Candid Appraisals of Industry War Position Given N.P.A. 33
War-Quality Fuels to Become Standard When Conflict Ends 34
Texas Oil Men Are Honored 37
The Markets 37
International News 38
Natural-Gasoline News 40
Natural-Gas News 40
Condensed Directories of OPC, WPB and OPA 41
Deaths 41
Refinery Activities 80
Who's Who in Refining 81
Pipe-Line Activity 82
Cretaceous Formations of the South and Southwest ..... *W. V. Howard* 86
Discovery Near Pauls Valley, Oklahoma, of Major Importance 88

Geological Section

Geologists Survey Need for Increased Discovery Rate ..... *W. V. Howard* 43
Geology May Afford Link in Good Neighbor Policy ..... *Wallace E. Pratt* 44
Geologists Discuss Problem of War and Oil Exploration 46
Wildcat Drilling in 1941 ..... *Frederic H. Lahee* 48
Abstracts of A.A.P.G. Survey of Developments in 1941 55
Technical Session of S.E.G. Reviews Year of Progress 57
S.E.P.M. Holds Symposium on Changes in Recent Sediments 58

Engineering—Operating

Gas-Cycling Increases Recovery ..... *Neil Williams* 61
Geologic Distribution of Oil in the Illinois Basin ..... *B. F. Hake* 63
Operating Ideas 67
Plantation Pipe-Line System Adopts Efficient Practices ..... *Paul Reed* 68
Refinery Ideas That Save $$$ 70
Design of Gun-Barrel Tanks for Oil-Water Separation ..... *Felix B. Gordan* 71
Influence of Columbium or Titanium Additions to 5 Cr Mo Steel ..... *C. L. Clark* 72
Co$t Engineering: Comparison of Cost of Pump Working-Barrel Operation 73
Co$t Engineering: Effect of Power Factor on Cost 75
Engineering Fundamentals: The Law of Perfect Gases 77
Engineering Fundamentals: Deviation of Natural Gas From Law of Perfect Gases 78
Questions on Technology ..... *W. L. Nelson* 79

Field Developments

Field Developments 85
Permian Basin, Panhandle ..... *Robert Ingram* 89
California ..... *L. P. Stockman* 90
Kansas, Nebraska ..... *Carl Hoot* 91
Louisiana Gulf Coast ..... *F. L. Singleton* 92
Texas Gulf Coast ..... *F. L. Singleton* 92
Appalachian Fields 93
Oklahoma ..... *Carl Hoot* 94
Eastern Texas ..... *Robert Ingram* 95
Southwest Texas ..... *F. L. Singleton* 95
North Central Texas ..... *Robert Ingram* 96
N. Louisiana-Arkansas 97
Illinois 98
Rocky Mountain Area ..... *T. R. Ingram* 99
Indiana, Ohio, Kentucky 100
Michigan ..... *Otto C. Pressprich* 101
Canada ..... *Victor Lauriston* 101
Among Drilling Contractors 102

Markets and Prices

Group 3 Market 106
New York Market 106
A.P.I. Refinery Report 106
Gulf Coast Market 106
Refinery and Tank-Wagon Prices 107
Crude-Oil Prices 107

Additional Features

Personal Paragraphs 104
Equipment News 108
Classified Advertising 110
Advertisers' Index 111

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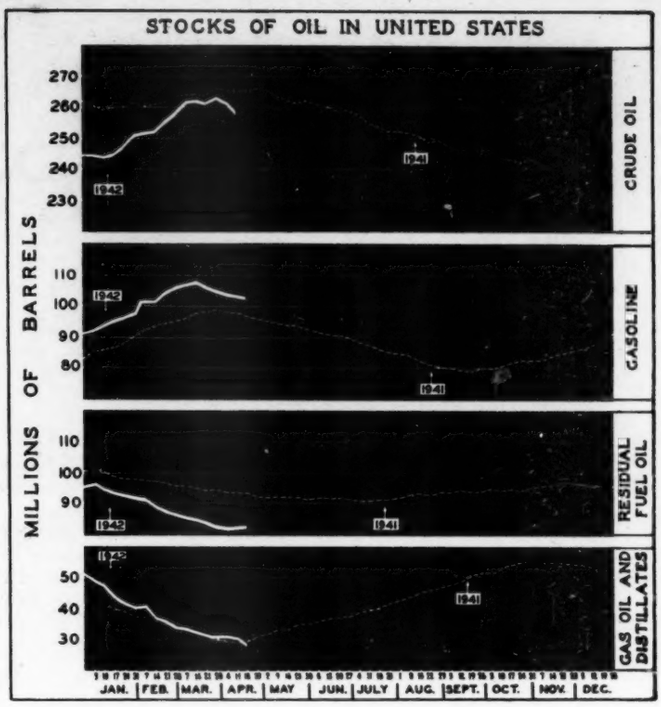
Trends

Earnings Reports for First Quarter Reveal High Operating Costs



AS reports are made available covering representative operations of the petroleum industry for the first quarter of this year, the significance of price and cost developments since the start of the war is becoming generally apparent. While the lower net earnings so far this year are partly due to the expected higher taxes of this year over 1941, the decreases in most instances are largely due to higher operating costs without compensating price adjustments in the industry's several markets. The report of a major company with large eastern refining and marketing operations, and substantial crude-oil production in the Southwest, is a case in point. Its earnings for the first quarter were 75 per cent lower than in the final quarter of 1941 and 55 per cent lower than in the first quarter of last year.

This company during the first quarter became a large tank-car shipper of crude oil from Texas to its Atlantic seaboard refinery. Normally this oil is transported to the Gulf Coast by pipe line and then by tanker to the eastern refinery at less than half the present tank-car charge. While some increases in refinery markets have been granted to offset the higher transportation charges in eastern shipments and pooling arrangements have been announced with the view of protecting individual shippers, the price increases so far made effective have not offset the increased costs.

The higher costs, as the industry's economists are pointing out, do not stop with eastern refiners transporting part or all of their crude-oil supplies by tank car. It would be difficult to find an operator in any branch of the industry whose costs have not increased over 1941; in most cases the increases are substantial. All have had higher labor and equipment costs. In many instances producers have had their allowables per well reduced. Refiners have curtailed their operations or have made revisions in processing which have added to costs per barrel of throughput. The consent decree involving several companies placed a ceiling on pipe-line earnings and transportation costs are generally higher.

The latest developments have been called to the attention of the Office of Price Administration with requests for price adjustments. While the industry has been promised relief, OPA emphasizes that its main function is to prevent inflationary developments. Studies that have been made reveal an exceedingly complicated cost situation as a result of the general disturbance in the oil industry's operations; the prewar relationships between divisions and products no longer prevail. Cases are cited in which continued operation is threatened unless price relief is granted.

CRUDE PRODUCTION *3,560,205 bbl. daily average — up 19,740 bbl. One year ago 3,755,125 bbl.*

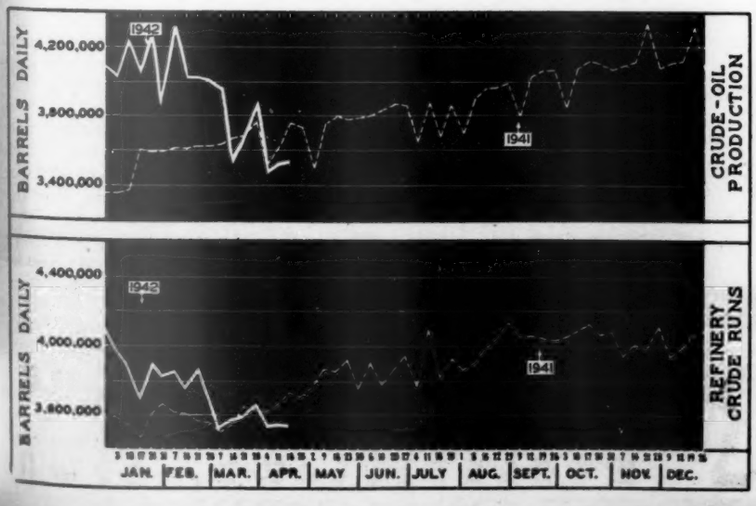
CRUDE STOCKS *258,442,000 bbl. as of April 11 — down 3,326,000. One year ago 265,160,000 bbl.*

GASOLINE STOCKS *103,502,000 bbl. as of April 18—down 1,078,000 bbl. One year ago 97,377,000 bbl.*

RESIDUAL FUEL-OIL STOCKS *82,577,000 bbl. as of April 18—up 51,000 bbl. One year ago 93,499,000 bbl.*

GAS OIL AND DISTILLATES *29,929,000 bbl. as of April 18—down 673,000 bbl. One year ago 29,680,000 bbl.*

REFINERY RUNS *3,548,000 bbl. daily week ended April 18 — up 30,000 bbl. One year ago 3,735,000 bbl.*



DAILY AVERAGE PRODUCTION FOR WEEK

	Apr. 18, 1942	April OPC recommended production	Apr. 11, 1942
Arkansas	73,455	74,000	73,535
California	638,250	659,800	629,250
Eastern fields	120,800	120,800	120,775
Illinois	295,785	354,400	298,825
Kansas	253,100	253,400	236,100
Louisiana	325,135	313,000	336,980
North Louisiana	*76,535*	.....	*81,630*
Louisiana Gulf Coast	*248,600*	.....	*255,350*
Michigan	59,200	60,200	56,850
Mississippi	96,320	49,800	99,040
Nebraska	3,950	5,000	4,300
New Mexico	86,130	86,000	86,130
Oklahoma	396,650	436,900	393,400
Rocky Mountain states	118,630	119,500	114,430
Texas	1,092,800	1,161,500	1,090,850
East Texas	*225,900*	.....	*225,700*
West Texas	*189,950*	.....	*187,400*
North Central Texas	*115,250*	.....	*115,800*
East Central Texas	*79,500*	.....	*79,300*
Texas Panhandle	*87,300*	.....	*101,900*
Texas Gulf Coast	*315,000*	.....	*314,300*
Southwest Texas	*79,900*	.....	*66,450*
Total United States	3,560,205	3,694,300	3,540,465
Total production, Jan. 1-April 18, 1942	421,832,280 bbl.		
Same period last year	389,152,870 bbl.		

Extensive Pipe-Line Plans Designed to Relieve East

By H. STANLEY NORMAN

REVOLUTIONARY changes are developing in the oil industry's transportation network, involving the most extensive marshalling of facilities ever attempted. A multipoint program, covering new lines, relocation of old pipe and expansion of existing facilities has been submitted by jointly functioning transportation subcommittees of Districts 1, 2, and 3 to the Office of Petroleum Coordinator where an engineering group is now studying the various proposals.

No announcement of the program has been made by OPC other than the general statement last week from Coordinator Ickes. (See The Oil and Gas Journal, Apr. 16, 1942.)

All major points in the transportation program are directed at the necessity of relieving the East Coast supply situation which is growing more acute each week and, unless corrective measures are taken, threatens to collapse next winter.

Deliveries to the East Coast via overland facilities may be increased approximately 250,000 bbl. per day if all suggestions in the program are approved and executed. A categorical answer is impossible to the question of exactly how much East Coast deliveries could be increased by proposed steps because of the variables involved.

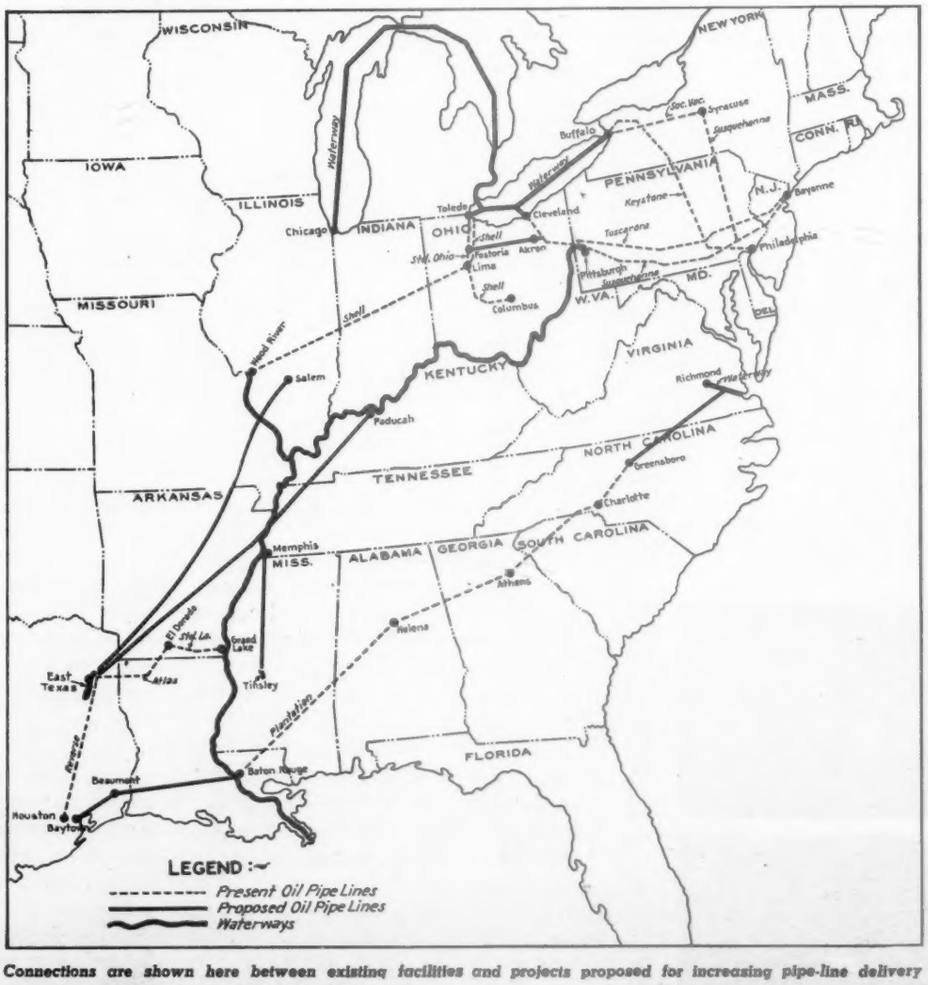
Reversal of flow through several product lines in the northeastern section of the country is a part of the program. Several lines in the Southwest would be subjected to similar treatment.

Details of the multipoint plant to increase deliveries of District 3 oil to points of consumption and refining centers in Districts 1 and 2 have not received approval of OPC's transportation engineering committee and have not yet undergone scrutiny of the War Production Board. There are some doubts that WPB will approve projects requiring any substantial amount of new steel or pump-station equipment. Each of the proposed lines, whether entirely new or predicated on use of reclaimed pipe, will require varied amounts of equipment and machinery of the types that are now most actively sought by manufacturers of materials used specifically for war products.

The most extensive project requiring new steel and pumping equipment is a proposed line of 20 to 22-in. pipe from the East Texas field to Salem, Ill. This line, assuming 20-in. pipe is made available, would handle 200,000 bbl. of crude daily and would require 114,000 tons of steel. Half of the crude carried by the line would be picked up in Illinois for rail delivery to the East Coast and the other 100,000 bbl. would become available to refineries in the Middle West to offset the declines already experienced and those anticipated in production from the Illinois basin.

Approximately 1,400 miles of line pipe now in the ground or in yards would be removed and relocated in various phases of the over-all program and at least part of the pumping equipment required would be withdrawn from stations no longer in service.

Movement of Texas crude to northeastern refineries would be increased through pipe lines currently used for this traffic. The additional deliveries totaling 25,000 bbl. daily would be moved across Pennsylvania by reversing flow through the Tuscarora Pipe Line Co. products line which could discharge at Bayonne, N. J. Standard Oil Co. of New Jersey and Tide Water Associated Oil Co. operate refineries at Bayonne which have a combined crude capacity of 181,000 bbl. daily.



Connections are shown here between existing facilities and projects proposed for increasing pipe-line delivery of crude and products to the East Coast

Would Use Second-Hand Equipment

Second-hand equipment, including pipe and pumping facilities, would be used to increase deliveries through the recently completed Plantation Pipe Line Co. system to 90,000 bbl. daily, an increase of 30,000 bbl. over present capacity. A 10-in. line built from available materials would be constructed from Beaumont, Tex., to Baton Rouge, La., the intake end of the Plantation line. The Baytown and Houston, Tex., refining district would be connected by rearrangement of existing facilities to the 10-in. line from Beaumont to Baton Rouge. Tentative plans call for supplying 30,000 bbl. daily from the Baytown-Houston area and 30,000 bbl. daily from Beaumont in making up deliveries of 60,000 bbl. per day to the intake end of the Plantation system.

More used pipe would be used in extending the Plantation line from its present northern terminal at Greensboro, N. C., to the Richmond-Norfolk vicinity in Virginia. The extension would discharge oil at points of substantial consumption and also make delivery where rail transportation to more northern points could be accomplished with greater dispatch.

A products line would be built with available materials from Fostoria to Akron, Ohio, which would draw off from Shell, Standard of Indiana, and Standard of Ohio systems passing near the former city. At Akron, the new products line from Fostoria would deliver into the western part of the Susquehanna (Sun Oil Co.) system for movement into Pennsylvania or farther East, if desirable.

Refineries along the Great Lakes would feed larger quantities of products to Buffalo, N. Y., via tankers. Either barges or the products lines of Socony-Vacuum, Keystone, and Susquehanna

MULTIPOINT pipe-line program under consideration by Government and industry, to relieve East Coast. Most proposals envisage use of reclaimed steel and auxiliary equipment. Several given good chance of fulfillment.

●

Standard-Pacific gas line from Kettleman Hills to San Francisco Bay to be converted to crude system, assures Richmond refineries adequate oil. A-1-A priority rating granted on necessary conversion materials.

●

Supply house Preference Order P-83 abolished, replaced by priority extension privileges and Form PD-1x.

●

War Production Board drastically limits benzene use in regular gasoline, so styrene, needed in synthetic rubber, may be increased.

●

East Coast stocks fall 1,357,000 bbl., while tank-car shipments to area climb to new peak of 586,325 bbl. daily.

●

Oil man promoted to third ranking office in WPB's Materials Division.

●

Treasury launches attack on depletion allowance, advocates reduction to 15 per cent.

●

Average yield of refinery gasoline declining. Decline of 1.8 per cent in February indicates trend now accelerated.

●

American-Mexican commission values expropriated oil properties at $23,995,991.

●

Refiners warned at N.P.A. meeting that chemicals for gasoline sweetening may become unavailable. Reduction in octane rating of regular motor fuel considered at Washington.

Wide World

SIMULTANEOUS CONSTRUCTION ON THESE FIVE TANKERS IS NEARING COMPLETION AT AN EASTERN SHIPYARDS. THEY AND OTHERS WILL SOON JOIN THE OIL-TRANSPORT FLEET, EASING THE SUPPLY SITUATION

This Week...

Group of Dallas, Tex., oil men consider financing for agency to build and operate barges on the Intracoastal Waterways system, to increase northern deliveries, ease production restrictions.

●

All OPC rejections of applications for exception to M-68 in District 5 will be returned to the Los Angeles office for review, in the future.

●

WPB places all heavy compressors under rigid restrictive order. May interfere with repressuring, pressure maintenance and recycling operations.

●

Crudes yielding high percentage of isobutane given special consideration in rearrangement of California allowables.

●

Manufacturers ordered to discontinue manufacture of oil burners for residential use after May 31, permitted to continue making industrial types bearing rating of A-10 or better.

●

OPA authorizes upward adjustment of Ritchie field, Louisiana, crude price, of 10 to 12 cents per barrel. Explained buyer sought crude for lube-oil manufacture.

●

Canada bars split-dealer accounts, specifies only one supplier may deliver to each outlet.

would be used in distributing the larger volume of products delivered at the eastern end of Lake Erie. Large refineries at Chicago, Whiting, Cleveland, and Toledo would participate in supplying additional quantities of products for eastern lake movement.

The Atlas Pipe Line Corp. system which was originally built to deliver East Texas and El Dorado, Arkansas, crudes to Shreveport, La., would be reconditioned and linked with the old Standard Oil Co. of Louisiana line terminating at Grand Lake on the Mississippi River. Deliveries to the northeastern areas would be made by barging up the Mississippi and Ohio rivers, possibly freeing petroleum supplies at intermediate points for movement to the East Coast in tank cars.

One of the existing crude lines from East Texas to the Gulf Coast would be reversed and converted to a products carrier with capacity of 60,000 bbl. daily. A combination 12 and 14-in. products artery from East Texas to Paducah, Ky., would be built of reclaimed pipe, extending north from the old crude line reversed from the Gulf Coast to East Texas. Delivery at Paducah would permit secondary distribution via barges moving up the Ohio River and would shorten the tank-car haul to the East Coast.

The last point in the program proposes an 8-in. crude line from the Tinsley field in Mississippi north to a point on the Mississippi River near Memphis, Tenn.

Provisions are being made to increase petroleum traffic on the Great Lakes this navigation season. The necessity of supplying an increasing portion of the Canadian refinery demand for crude oil, however, may more than engage all of the expanded lake-marine facilities. There are 77 tankers now engaged in Great Lakes petroleum transportation. One former ore carrier was converted to an oil tanker during the past winter.

During 1941, 68,948,523 bbl. of petroleum were moved via the Great Lakes, according to the Lake Carriers Association in its recent annual report which included this traffic in statistics for the first time. Lake tankers can deliver cargoes as far east as Buffalo, N. Y., although, normally, there is a substantial movement west from that point which is supplied by the product pipe lines of Socony-Vacuum, Susquehanna, and Keystone (Atlantic). Northern and western New York State normally receive a large part of oil requirements via small ocean tankers moving north from Gulf or Atlantic Coast refineries through the Hudson River to Albany and by barges through the New York Barge Canal.

●

California Gas Line To Be Converted to Crude Service

LOS ANGELES, Calif.—The transformations that are taking place in the refining, producing, marketing and transportation branches of the California oil industry will soon render Axis submarines on the Pacific Coast as impotent as a machine gun without bullets because steps are well under way to remove all tank ships in commercial use. Within a short time not a single barrel of commercial oil will be moved out of California ports by marine transportation. This is being accomplished by the transportation committee of District 5, of which Charles S. Jones, president of Richfield Oil Corp., is chairman, and involves the use of all pipe lines in the state.

The most important development will be conversion of the Standard-Pacific Gas Line, Inc.'s natural-gas line into an oil pipe line. This change is only one of several steps being taken to enhance the flexibility and operation of California pipe-line systems. The Stanpac pipe line is owned jointly by Standard Oil Co. of California and the Pacific Gas & Electric Co., and was constructed in 1930 to facilitate the delivery of Kettleman natural gas to the San Francisco Bay region and some to Standard's Richmond refinery.

The importance of converting the Stanpac gas line into an oil line is obvious when it is considered that this installation will hold about

600,000 bbl. of crude oil when full. The capacity of the line to deliver crude will depend upon a number of variable factors, including operating pressure and type of oil handled. It is assumed that by using only the highest-gravity crude oils, the line may be able to deliver 125,000 bbl. per day, but installation of additional pump or booster stations along the line could double the capacity.

The Stanpac gas line extends northwest from Kettleman Hills in Fresno County to Richmond on San Pablo Bay and laterals are already under way to connect up the Avon refinery of Tide Water Associated Oil Co., Oleum refinery of Union Oil Co., and Martinez refinery of Shell Oil Co., Inc.

In addition to the Stanpac gas line into the San Francisco Bay region, Shell has a 10-in. welded main trunk extending northward from Bakersfield and an older pipe line from Coalinga to Martinez. Tide Water also has a trunk system with several loops extending northward from the southern San Joaquin Valley to the Avon refinery. Standard's old pipe line from the San Joaquin Valley to Richmond refinery was abandoned several years ago and the pipe, after being reconditioned, was used in other areas.

May Move Heavier Grades

If refiners move light refinable crude oil in the converted Stanpac line, and this appears probable, Shell and Tide Water will be able to move the heavier grades. This is of primary importance because if marketers decide to move Santa Maria Valley, Gato Ridge or other crude oil from the Coastal district by pipe line, Union Oil Co. will be able to reverse its Producers Transportation system which extends from the San Joaquin Valley to tidewater at Port San Luis. Thus instead of pumping San Joaquin Valley oil to tidewater the company would be in a position to pump oil from the Coastal district eastward into the San Joaquin Valley where it could be picked up either for movement north to San Francisco or to southern California. Union Oil Co. could also convert its natural-gasoline line to crude oil and thus this line, extending from Kettleman Hills to tidewater, could be used to pump back heavy crude oil from the Coastal area.

Present intention is to use all pipe-line facilities in California for the common good and thus for the first time in history it will now be possible to move crude oil from Los Angeles Basin to San Francisco entirely by pipe line. With the north central part of the state taken care of by Shell, Tide Water and the new Stanpac lines into the San Francisco Bay region, there should be sufficient crude oil available to meet practically all emergencies.

The southern part of the state is also well taken care of due to the existence of numerous fields in southern California and the existence of two main trunks extending from the San Joaquin Valley to Los Angeles Harbor. These pipe lines are the systems of Richfield Oil Corp. and General Petroleum Corp., the latter line being looped for part of the way. In addition to lines from the San Joaquin Valley, Shell completed a new crude-oil line from Ventura to Los Angeles last year and this installation has been moving oil produced in some sections of the Coastal district for several months.

Maximum use of all pipe lines in the state as a single unit will permit companies to release tankers for other service. There are many problems in connection with the use of all pipe-line systems and these remain to be ironed out at a later date. In the meantime, marketers will take deliveries of crude oil and continue operation. Obviously it will not be possible for a marketer to get back the identical crude oil put into a line as it is not the present intention to batch pipeline receipts.

The Stanpac gas line now being converted to a crude-oil line consists of 120 miles of 26-in. pipe; 26 miles of 24-in.; 44 miles of 22-in., and 10 miles of 2-in. pipe, making a total distance covered of 198 miles. The terrain between Bakersfield and Richmond in the San Francisco Bay region is relatively level and for this reason the pumping problem will not be difficult. Inspection of the line made recently shows it to be in exceptionally good condition and comparatively free of corrosion. The 26-in. pipe was, when laid, the largest high-pressure gas-transmission line in America and it still probably ranks well up near the top of the list. The 26-in. pipe is $\frac{7}{16}$-in. thick and a 40-ft. joint weighs about 3,400 lb. The remainder weighs between 2,400 and 2,900 lb. to each joint.

Power of Review Granted in District 5 M-68 Rejections

LOS ANGELES, Calif.—The Pacific Coast organization of the Office of Petroleum Coordinator will review all future rejections of requests for exceptions to Conservation Order M-68. This disclosure was made at a meeting here April 18 called by the District 5 production committee for a general discussion of M-68 and P-98 with California operators and federal Government representatives.

The Los Angeles meeting was the first of two assemblies held in California for the purpose of acquainting operators with regulatory measures. The power of review on M-68 rejections now vested in the District 5 OPC organization received approval of the 750 operators attending the meeting. This step has been long advocated. California operators have contended that conditions peculiar to the West Coast could not be adequately judged on the basis of conditions in the Mid-Continent and Gulf Coast and that special consideration should be given to Pacific Coast development and drilling problems. Rigid spacing rules are particularly opposed by California operators in fields like Santa Fe Springs with seven productive zones, Wilmington with four pays and several others with similar conditions.

E. E. Pyles, chairman of the production committee for District 5, presided at the meeting here. Government representatives were: D. R. Knowlton, director of production, OPC; A. L. Weil, who recently resigned as chairman of the general committee for District 5; C. T. Reichert, director of materials for District 5, and Maj. F. E. Wilder from the Office of Provost Marshal General, War Department.

Mr. Knowlton covered in detail the many problems confronting the oil industry and following his talk the meeting was thrown open for general discussion. Mr. Knowlton agreed that California has some peculiar problems involving multiple zones and marine development that demand careful consideration. He advocated that instead of filing single requests for exceptions to M-68 operators agree on a plan and submit the entire program to Washington for consideration as this would permit faster action and simplify operations in the OPC. Provisions of M-68 have reduced drilling operations 59 per cent, it was pointed out, but the percentage varies in different sections.

Mr. Pyles explained that product demand is now a major factor in setting California allowables. He said this factor was considered in granting an increase of 8,000 bbl. per day to Kettleman North Dome and Ventura Avenue after the April allotments had been made. This increase was necessitated because the production of isobutane had dropped below anticipated levels. California crudes most adaptable to recovery of isobutane are Long Beach, Huntington Beach, Santa Fe Springs, Ventura Avenue and Kettleman North Dome. The allocation committee was unable to step up production in the first three fields and accordingly granted an increase of 8,000 bbl. per day each to Ventura Avenue and Kettleman North Dome.

A. L. Weil, who recently resigned as chairman of the general committee for District 5, stated his retirement did not indicate any difference of opinion. Mr. Weil is counsel for several oil companies protesting the Government's right to fix the price received for royalty oil, gas and natural gasoline produced from public lands in the Kettleman North Dome field. Trial of the case has been set for an early date.

Geological Features

This week the American Association of Petroleum Geologists, the Society of Economic Geophysicists and the Society of Economic Paleontologists and Mineralogists are holding their annual meetings at Denver. Reflecting the importance of these organizations to the oil industry, The Oil and Gas Journal presents a number of geological articles in this issue.

Beginning on Page 43 is a summary of the views of leading oil geologists on the methods by which geologists can meet the nation's need for new reserves. These opinions were collected by the A.A.P.G. research committee, under the leadership of A. I. Levorsen.

An article by Wallace E. Pratt, vice president, Standard Oil Co. of New Jersey, showing the contributions made by geologists in cementing friendly relations with other countries, begins on Page 44, and an analysis of the results of wildcatting in 1941 and of the discovery rate by F. H. Lahee, chief geologist, Sun Oil Co., will be found starting on Page 48. Abstracts of other important papers are also published in the geological section.

In the Engineering and Operating Section, there is an article on developments in the Illinois basin by Benjamin F. Hake, Gulf Refining Co., on Page 63, and in the Field Section, correlation charts, prepared by members of the committee on stratigraphy of the National Research Council show the practical application of this branch of science to the location of oil deposits (p. 86).

TYPICAL OIL-FIELD STRUCTURES

Following Page 56, is a colored insert, discussing the geology of the Yates field, Pecos County, Texas, and limestone fields of this type. This is the first of a series of similar studies of Typical Oil-Field Structures scheduled for publication in The Oil and Gas Journal.

Oil Industry Moving Rapidly Along Several Fronts

The oil scene as viewed from the nation's capital changes from day to day. In this article are reviewed some of the recent developments which have immediate and long-range significance in oil operations.

By C. O. WILLSON

WASHINGTON, D. C.—The oil industry as reflected in the reports of governmental agencies which are directing many phases of its activities, is moving rapidly in several directions. The Office of Petroleum Coordinator, the functional committees which OPC established months ago, the Petroleum Industry War Council, and other representatives of the Government and the industry, are cooperating in carrying out what is now the most far-flung war program of any major industry.

Transportation

The seriousness of the transportation situation cannot be overemphasized. Information on tanker-shipping conditions is no longer available, but it is no secret that sinkings are continuing at a rate which, if continued over another 90 days, will so cripple this all-essential arm of the United Nations' war effort that 2 or more years must elapse before oil-shipping facilities could be made normal again.

The Axis raids on shipping which have centered on tankers, have been successful along the East Coast and many other points in the Atlantic and adjoining seas because the needed protection has not been given. This has been promised for the future, but in the meanwhile there is every reason to believe that petroleum "salt-water transportation" along the Atlantic seaboard will be reduced to a minimum and possibly stopped entirely until protection can be given to the boats which continue in the service of furnishing oil to the eastern and southeastern sections of the United States.

It is readily apparent what a complete stoppage of the petroleum movement from the Gulf Coast and the Caribbean sources of supply to the Atlantic seaboard states would mean. This movement normally is around 1,500,000 bbl. daily, not including the shipments to Canada which account for approximately 40 per cent of that country's supply.

The partial offsets to the loss in ocean transportation are being expanded as rapidly as possible. Tank-car shipments of crude oil and products have passed 575,000 bbl. daily and until there is improvement in the tanker situation there will have to be further expansion. This can only be done by giving petroleum shipments special consideration in rail movements. This practice, according to railroad officials, will mean delays in other shipping and there are limitations as to what can be done in this regard and how long it can be continued.

The effect on other shipping is only one of several problems that have arisen in connection with the greater use of rails by petroleum shippers. The long hauls and the high speeds of movements by solid trains have increased mileage per car from two to five times. The eastern part of the United States normally is not a large user of tank-car transportation and most of the repair shops are located in the Middle West and Southwest, a situation which complicates the proper maintenance of cars. It will be necessary to provide shops in the East and the existing facilities in other parts of the country will have to be enlarged. Shippers state that a prolonged heavy movement of petroleum to the eastern and southeastern states will mean that hundreds of new cars will have to be built to replace those which will go out of service.

Motor Transportation

There is steady progress in increasing petroleum shipments by motor transportation. Complete checks of all these facilities have been made and studies are under way to determine the greatest possible utilization of these carriers. Through pooling arrangements and by keeping the units in operation, so far as possible, 24 hours daily, 7 days a week, petroleum deliveries in certain areas have been greatly increased. Similar programs are to be made effective in other parts of the country. The principal objective of this coordination of motor shipping is to replace tank cars in short hauls.

Plenty of problems are also developing in the expansion of this type of transportation. Complaints are heard that tires and repair parts are not always readily available. The fact that state requirements in the matter of truck weights and other regulations are not uniform, has complicated shipping where interstate movements are involved. Those closest to this situation are sanguine that motor transportation operated as a unit will make a worth-while contribution to the solution of the transportation problem this year.

A similar program is being worked out in the matter of inland waterways. Complete reports have been made covering tankers, barges and all other boats capable of transporting petroleum on inland waterways. In inland-waterway activities little attention will be paid to ownership, the operation being directed with the view of securing the largest possible movement to relieve the eastern shortage.

Pipe Lines

While trucks, tank cars and inland waterways have made an important contribution in helping to close the transportation breach, it daily becomes more apparent that the only immediate and long-range answer to oil-transportation difficulties is more pipe lines. "Every study we have made," according to one pipe-line operator who has served on various transportation committees, "leads to the conclusion that we must rely mainly on tankers and pipe lines for the bulk movement of petroleum. Since tanker shipments will be greatly reduced, there is only one answer left, and that is additional pipe lines."

The construction program which has been approved by the industry's committees and by OPC is an attempt to get the most out of existing pipe lines and other transportation facilities by extending lines, building connecting lines, looping,

Pipe line being taken up in Mid-Continent field for use in another area to aid in the program to increase oil shipments to eastern states

and reversing movements. Several features of this program are explained elsewhere in this issue.

It is estimated that part of the construction can be completed in 3 months and the remainder within 9 months, including the East Texas-Salem line, provided the pipe, pumping equipment and other materials are made available as needed. It is said that the present status of pipe-line construction is such that several contractors will be able to participate in this new work.

Large Lines Needed

It is pointed out that these new pipe-line projects and the largest possible expansion in tank cars, trucks, and barges will fall short of offsetting a 75 per cent stoppage of coastwise tanker shipments. The only way to close the remaining gap, according to those closest to conditions, is to build one or more lines of large diameter connecting Atlantic seaboard refineries with the fields of the Southwest. Each line would be capable of handling 250,000 to 300,000 bbl. daily.

The economics strongly favors these large lines. In relation to capacity, they represent a minimum use of steel and over-all operating costs per barrel of oil transported, are a fraction of the costs involved in the expansion of truck, barge, and tank-car shipments.

These costs are also much lower than when smaller pipe is used. Because these lines of large capacity would be comparable in operating costs to tanker shipments, those sponsoring their construction stress the fact they would be a contribution to the postwar oil economy and would also be a part of this country's permanent defenses. It is agreed that a grave mistake was made when the plans of the industry and Petroleum Coordinator Ickes to build the first defense line from East Texas to eastern refineries, via Illinois, were opposed by government agencies who contended that the steel should be used in the building of ships and in other war construction. The line, if it had been started last fall as planned, would now be partly in operation and entirely completed by early summer.

The seriousness of the present transportation situation has been brought to the attention of WPB repeatedly in recent weeks, and it is hoped that "war cabinet" body will look with greater favor than it has in the past to the industry's request for essential transportation materials and equipment required to solve the most pressing problem of the entire country.

Refining

Many of the problems of transportation, in a very real sense, carry on to refinery operations. Normal marketing areas for most refiners have ceased to exist. Many have been compelled to curtail their plant operations, due to the loss of markets and, in a few cases, complete shutdowns have been necessary. The curtailment in the consumption of motor fuels, due to the rubber shortage, and rationing in most of the coastal states, and the necessity of furnishing the Atlantic seaboard states with all grades of fuel oils, have brought major changes in processing methods. The end in that development is not in sight.

Many who have studied trends in governmental supervision are confident that the pooling of operations now under way in transportation will eventually include refineries. They feel that to take care of the changes in demands for petroleum products and the necessity of moving products from refineries to points of consumption with the shortest possible hauls, will result in a situation in which refiners will be asked to make whatever adjustments in the plant operations are needed to contribute to this general program. The fact that many plants will manufacture 100-octane aviation gasoline, military lubricants, synthetic rubber, and other war products, also enters into the operating future of refineries.

According to one prediction, the time is not far distant when each of the 450 operating refineries in the United States will be analyzed as to what its maximum contribution to the war program should be. They will then be asked to operate on that basis. Preferential consideration will be given to those plants which manufacture one or more of the war products. However, this will not mean that because a plant is making 100-octane gasoline it will be permitted to operate at capacity in all the other divisions of its operations. A plant operating with low-gravity crude oils may be asked to shut down its cracking facilities and change its processing methods to secure the maximum yields of distillates, gas oils and residual fuel oils. A Mid-Continent plant, with a well-balanced skimming and cracking operation, may be permitted to operate on a normal basis, supplying all domestic motor fuels required within its local area. Another operation in the same area may be shifted to greatly decrease motor-fuel yields with increased recoveries of furnace oils, all of which will be shipped to one consuming area. The possibilities in this plan and also the complications, will be apparent to every plant operator or sales manager. Because operating costs will change with these adjustments in plant processing methods, it has been suggested that all operations be pooled as is being done in the eastern distribution to cover the widely varying transportation charges. The refiner would draw on this pool on a basis of plant costs.

NEXT WEEK

The Equipment Maintenance Number

This "Maintenance for Victory" number of the Journal has been designed as a handy manual on getting the best service and longest life from your equipment and supplies. The industry has been told that it must produce more of its products with less of the tools and equipment it employs.

Oil men will increasingly have to employ substitute materials that will release vital war supplies. It will have to repair early and often to avoid premature replacements. It will have to adopt rigid maintenance programs to insure longest life. Next week's issue will tell you what others are doing, and what you can do, to achieve these ends. BEHIND THE STEEL YOU SAVE ON THE DERRICK ARE ADDITIONAL BATTLESHIPS.

100-Octane Gasoline

It is stated here that more than 40 projects for the manufacture of 100-octane gasoline have either been finally approved or are in the process of approval, providing for a production of approximately 300,000 bbl. daily. These plants are about equally divided in numbers between the large and small refining companies. Some of the projects which are still pending include cooperative plants of the smaller independent refiners. These proposed plans vary in detail, but in general they are similar in design to several of the large units in which 100-octane fuel is manufactured in one complete operation involving catalytic cracking and alkylation. In these cooperative programs, gas oil from two or more refineries will be shipped to a new centrally located plant which will be operated as a joint enterprise. A large number of refiners have been in Washington recently in connection with these programs which, if approved, will add to the production already provided for.

There are those who state that the pooling of information that has materialized as a result of the military need for large quantities of high-octane gasoline will "revolutionize" refinery processing methods. It is contended that because refinery profits in recent years have either been narrow or nonexistent, plant operators have not been able to take full advantage, in commercial operation, of the numerous developments based on research and development. The fact that the commercial applications of catalytic cracking are new and the industry generally has just begun to realize the chemical-product possibilities in petroleum manufacturing, is also stressed by those who vision a postwar period in which motor vehicles will use the high-octane gasolines now being refined for airplanes, with the industry entering new manufacturing fields.

Synthetic Rubber

While the 100-octane program was developed and is being supervised by OPC, the synthetic-rubber plans at this time do not have the same status. Much of the preliminary work in the plans to manufacture butadiene from petroleum hydrocarbons has been done under the supervision of OPC's refining division. This was a logical procedure because the liquid and gaseous products which will be used in processing will be obtained from refineries and present plans call for the operation of butadiene plants with refinery personnel.

The program for the production of 700,000 tons yearly of synthetic rubber is now under the control of the rubber authority which government officials state will occupy the same position in the rubber industry as OPC does in petroleum and natural-gas operations. Whether the Rubber Reserve Co., operating under WPB, intends to establish a large technical organization to design, construct and direct the operation of the buna-rubber and butyl-rubber plants in which oil-refining and chemical companies will participate, is not clear. Presumably it does. Within the petroleum industry there is a feeling that this work can best be directed through OPC's refining division or through an organization which would assure the close coordination of refining and synthetic rubber operations.

OPC is working on the plans to add 300,000 tons to the rubber production for civilian use as recommended by the PIWC at its April meeting. New and old methods of manufacturing butadiene in large-scale operations are under consideration.

Technicians agree that the manufacture of 700,000 tons annually of synthetic rubber is the larg-

est single job that a group of oil companies has ever undertaken. As expressed by one operator whose company will participate in the ¾-billion-dollar program, those in charge of construction and operation are starting largely from scratch. By that is meant present manufacturing knowledge is confined to small-scale operations and the usual troubles experienced in ironing out the kinks in new operations is expected to be magnified many times before the production of synthetic rubber is on a settled plant basis.

The rubber authority is expediting the preliminary arrangements which will precede the start of construction. It is known that the materials which will be used in building the plants will receive the same priority rating as the 100-octane units and few delays are expected in construction after the design has been approved by the government financing agencies.

Production

Production activities of the petroleum industry as directed by OPC are temporarily in an eclipse due to the special attention that government agencies and the petroleum industry have been compelled to give to transportation and refining. No important revisions of M-68 or in the method of enforcement appear to be under consideration.

Secondary-recovery operations have been given the green light and the production department is prepared to work out problems incidental to shallow drilling on a basis which will permit continued development. The matter of granting exceptions to the 40-acre drilling pattern in order to provide more oil in certain Mid-Continent and Middle West fields has been given consideration. These exceptions have been advocated as a means of quickly increasing oil supplies in those areas where demands exceed the present output due to transportation conditions. The shortage of tankers has expanded the demands for oils in many interior fields which presumably could increase their flush output if permission was granted to drill as exceptions to M-68. The production department feels that progress is being made in working out pooling arrangements which do not necessarily require unit operation but which permit operators to carry on a 40-acre development until such time as materials can be provided to drill on a pattern required to secure the maximum economic recovery.

OPC is cognizant of the fact that wildcat drilling has declined with a resulting decrease in new-field discoveries. Some expect wildcatting to improve later in the year, pointing out that geophysical and other exploratory work is being conducted over a wide front. Others feel that special inducements will be necessary in order to revive wildcat activity. More will be heard about the needs of the exploratory and producing branches as soon as the more pressing problems of transportation and refining are under control.

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States Are Urged to Observe OPC's Production Quotas

WASHINGTON, D. C.—Observance of production rates certified by the Office of Petroleum Coordinator was pledged here last week at the closing sessions of the first meeting of the National Conference of Petroleum Regulatory Authorities.

Before disbanding, the regulatory officials called to Washington by Petroleum Coordinator Ickes, demanded "a fair price" for crude, asked for a more liberal development policy on public lands, and for retention of the 27.5 per cent depletion allowance on oil production.

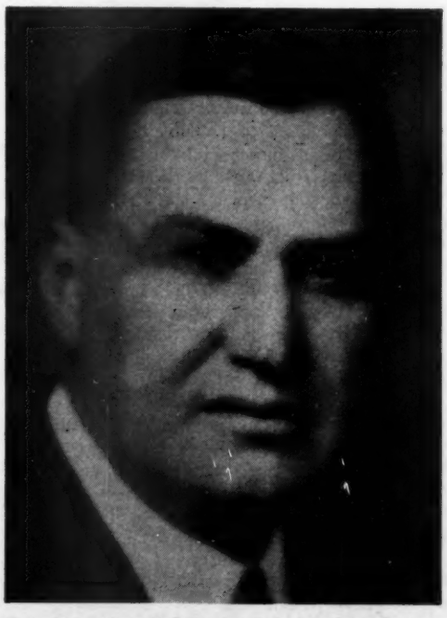
The group perfected a permanent organization headed by Hiram M. Dow, New Mexico representative to the Interstate Oil Compact Commission, who was elected chairman of the conference. Other officers named were: Jerry Sadler, Texas railroad commissioner, vice chairman and P. J. Hoffmaster, supervisor of wells for the Michigan Department of Conservation, secretary.

Resolutions adopted by the regulators called for efficiency in government, careful consideration of restrictions on drilling, and for encouragement from the OPC for closer cooperation between state boards and operators in planning applications for exceptions to M-68.

The committee on allocations which urged state regulatory bodies to observe the production quotas certified by OPC was composed of Andrew F. Schoeppel, chairman of the Kansas Corporation Commission; C. T. Smith, Illinois representative; Joseph McHugh, Louisiana commissioner of conservation; Mr. Sadler, and Reford Bond, chairman of the Oklahoma Corporation Commission.

Warwick Downing, chairman of the Colorado Gas Conservation Commission; Austin B. Middleton, chairman of the Montana Board of Railroad Commissioners; Reed Bush, chief, California Division of Oil and Gas; Parker L. Melvin, Pennsylvania representative, and N. W. Shiarella, president of the Kentucky Oil and Gas Association composed the resolutions committee.

Call of the next meeting was left to discretion of the organization committee headed by Mr. Dow and with the following members: John M. Kelly, member of the New Mexico Oil Conservation Commission, and Messrs. Hoffmaster and Melvin.



Hiram Dow, New Mexico representative to the interstate oil compact, is permanent chairman of the National Conference of Petroleum Regulatory Authorities

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Tanker Rate Surcharges Raised by Shipping Board

WASHINGTON, D. C.—Increased surcharges on tanker freight rates for transportation of petroleum products in Caribbean and South American trades were announced April 17 by the War Shipping Administration.

Effective with loadings made on and after April 1, a surcharge of 60 per cent has been authorized to be applied to basic rates for the trade from United States Gulf and Caribbean ports to those of Brazil, the River Plate and Chile. The new surcharge will replace a 20 per cent surcharge, effective since March 1, 1942.

The administration also authorized new surcharges for movement of petroleum products between United States gulf ports, Mexico, Cuba, Panama, Puerto Rico, Virgin Islands and Aruba. The new surcharges, effective with loadings made on and after April 1, 1942, are as follows: Between United States gulf ports, Port Arthur to Tampa, inclusive, 115 per cent; between United States gulf ports (including Tampico) and Cuba, 110; between Caribbean ports and Cuba, 165; between Aruba and Panama, 115; between United States gulf ports (including Tampico) and Puerto Rico and Virgin Islands, 110; between Caribbean ports and Puerto Rico and Virgin Islands, 155; between Caribbean ports and Aruba, 155.

The current surcharge of 25 per cent in those seven trades was made effective with loadings made on and after March 1, 1942.

The new surcharges were authorized by the administration in view of the increased cost of tanker operation due to lengthening of voyages through new routings and higher insurance rates.

Heavy Compressors Placed Under Strict Allocation

WASHINGTON, D. C.—Heavy compressors, needed in the war production program, were placed under a system of complete allocations by War Production Board order (L-100) announced April 17. It prohibits the placing or acceptance of orders for compressors covered by the regulations unless specific authorization is made on Form PD-420. Application for authorization to place orders must be made on Form PD-415.

As defined by the order, heavy compressors subject to the terms of the regulations are classed as "critical compressors." This means "any crank and flywheel type horizontal reciprocating compressor or dry vacuum pump having a displacement of 50 cu. ft. per minute or more, or any other reciprocating compressor having a displacement of 300 cu. ft. per minute or more, and includes new, second-hand, and reconditioned equipment."

Operators Told to Send Orders to Chicago OPC Office

All purchase orders for repair and maintenance equipment in the oil industry, requiring countersignature of the District 2 director for the Office of Petroleum Coordinator, are to be sent in the future to Chicago office, 120 South La Salle Street.

Temporary assignment of E. E. (Ned) Robbins to liaison duties with the War Production Board, Washington, D. C., caused closure of the Tulsa office through which purchase orders had been cleared for part of District 2 during the past several months.

STATE CAPITALS...

ILLINOIS

ILLINOIS OFFICIALS are optimistic over "some degree of success" following presentation of a formal application April 15 to Petroleum Coordinator Harold L. Ickes looking toward modification of the M-68 well spacing order.

Gov. Dwight H. Green, who instructed an Illinois delegation to make the request because current restrictions were "working a distinct hardship on the state's petroleum industry," said he received a warning from Mr. Ickes that strict oil regulation by states is still necessary if the federal Government "is to rely upon their voluntary cooperation."

G. C. Curtis, superintendent of the state Division of Oil and Gas Conservation, who headed the governor's delegation to last week's Ntaional Conference of Petroleum Regulatory Authorities, said Mr. Ickes "agreed to liberalize exceptions to the federal regulation, giving preferential consideration to shallow-sand wells where requirements for steel are low."

"Federal authorities," the governor said, "were surprised to learn that the search for new oil reserves had been retarded in Illinois as a result of the regulation while it had stimulated the search in some of the other states. Wildcatting increased 6 per cent in Oklahoma and from 25 to 35 per cent in Texas after the rule was imposed. In Illinois there was a drop of 40 per cent during the same period."

Samuel F. Peterson, chief Illinois state petroleum engineer, was named on a national committee at the conference to report on the production quotas assigned to the respective oil states by the OPC.

CALIFORNIA

THE NEWLY DEVELOPED California conservation plan which appears to be meeting the demand for a program to provide the essential materials for the war effort and to take care of civilian needs as far as possible is a step in the right direction. The plan is predicated on the principle that refined-oil requirements should be the yardstick of what crude is produced. The new plan is the diametrical opposite of what has been done in the past. The committee now decides what refined oil will be needed and then allocates crude to fill the requirements. Under this new arrangement heavy-crude-oil producers are enabled to withdraw maximum allowable.

Before additional producing and drilling equipment can be installed it will be necessary for producers of heavy crude to receive a price increase to cover operating expenses.

RESTRICTIONS AGAINST delivery of gas for operation of central space-heating equipment will not be lifted in California, the California Railroad Commission has been notified by the War Production Board.

Gas companies in various states, including California, have been prohibited from delivering gas for central heating equipment unless it was installed before March 1.

Purpose of the order was to conserve gas, because a survey showed gas utilities would be unable to serve additional central heating customers and continue uninterrupted service to war industries, unless additional transmission lines were constructed.

LOUISIANA

COMMITTEES OF LOUISIANA oil men have been created under jurisdiction of the Stream Control Commission for a more direct attack on the problems of waste-disposal problems. The state has been divided into northern and southern districts to deal with controls of waste disposal. The South Louisiana group will meet at the Lafayette, La., city hall at 10 a.m. April 30 for a preliminary meeting. A similar meeting of the North Louisiana division was held at Shreveport April 23.

The Stream Control Commission proposes establishment of a state-wide committee of six members with equal representation from major oil companies and independent operators.

TEXAS

BOTTOM-HOLE PRESSURE in the East Texas field increased 19 lb. during March, the Railroad Commission reported last week in a survey that shows the average of 1,026.87 lb., as of April 1. Pressures in the field had been consistently lower in each of the preceding 6 months. A decline of 15.85 lb. in the pressure during January prompted a special request from the Office of Petroleum Coordinator for corrective measures which the Railroad Commission instituted in the form of lower withdrawals. The decline in February was modified to 1.86 lb., followed by the most substantial increase in March which had been reported from East Texas in more than a year. Pressures on April 1 were 1.29 lb. higher than on January 1 and only 20.35 lb. lower than a year ago.

THREE OPERATORS in the Minnie Bock field of Nueces County have been denied a motion asking that they be allowed to move oil heretofore produced in excess of allowable under a district court injunction.

The injunction under which the operators were producing in excess of the Railroad Commission allowable specified that the overage must be held in storage. Tanks are full and operators sought to move part or all of the excess production in order to continue operations under the more liberal withdrawals permitted by the District Court.

Motion of the operators was denied by the Third Court of Civil Appeals which held that it did not have jurisdiction.

BASIC OPERATIONS of the state's oil industry are substantially higher in February than a year ago despite the shortage of transportation facilities with which to move Texas crude and products to consuming markets of the country. This conclusion was shown this week by the Railroad Commission's February report.

Texas contained 98,933 producing oil wells at the end of February and the daily average per well production was 15.55 bbl. Considering the state as a whole, the actual production was 4.2 per cent below the theoretical allowable. A year ago, the state's wells produced an average of 13.46 bbl. daily, when there were only 94,845 producers.

ARKANSAS

TESTIMONY ON THE DESIRABILITY of permitting multizone completion of wells in the Dorcheat and Macedonia fields in Columbia County was one of several issues considered by the Arkansas Oil and Gas Commission at its regular hearing April 22.

Methods of allocating production among 40-acre units now in production and the 80-acre drilling units subsequently proven in the Dorcheat field was another matter reviewed by the regulatory body.

G. Scott Hammonds requested a change in the method of prorating production in the Atlanta field, Columbia County. He advocated a method to include an increase in the specified gas-oil ratio, employment of a volumetric formula similar to that employed at Dorcheat and Village fields and the designation of new key wells for the taking of bottom-hole pressures.

Several members of the Powledge family protested the manner in which the Schuler unit is being produced. The Powledge family lease is operated by the Alice Sidney Oil Co. and offsets the unit acreage.

NEW MEXICO

CRUDE-OIL BUYERS in the state last week received instructions from the Conservation Commission to run the full allowable during remainder of April from wells producing 10 bbl. or less daily. The commission abrogated the ratable taking law as applied to wells in the 10-bbl. classification.

The order was based on results of a survey which, the commission declared, indicated that pipe-line proration instituted by some purchasers would do irreparable damage to the small wells.

COLORADO

TRANSPORTATION OF GASOLINE by tank truck is showing a large increase in this territory as revealed by the annual report of the Colorado Motor Fuel Division. Of 165,954,000 gal. imported into the state in 1941, 82,638,000 gal., or 49.7 per cent of all imports, was moved in tank trucks. In 1935 only 16.9 per cent was transported in that manner. A similar increase was made in intrastate movements by truck.

OKLAHOMA

MARKET DEMAND for Oklahoma crude during May will be determined at the Corporation Commission's regular hearing at 11 a.m., April 28, at Oklahoma City, Okla.

the OIL AND GAS JOURNAL

PRODUCING REFINING NATURAL GASOLINE PIPE LINE

Published weekly by The Petroleum Publishing Company at Tulsa, Oklahoma

A Job for Explorers

The question is frequently raised as to whether the Government is making full use of the petroleum industry's explorers. The query is particularly apropos this week as the three societies, engaged primarily in the search for new oil, hold their annual meetings in Denver.

Right now the petroleum industry and the nation are more concerned with what is going on in other divisions of the industry's operations. The petroleum-transportation situation is critical with large consuming areas threatened with more severe rationing than has been made effective so far.

The Army and Navy are asking our refiners to produce 100-octane gasoline at a rate which will exceed the daily average consumption and exportation of all motor fuels during the last year of the previous war. Our military and millions of civilian users are concerned as to whether refinery technicians will be able to supply all essential activities with synthetically produced rubber--an entirely new enterprise for this industry.

In crude-oil production, operators are endeavoring for a time to maintain the required crude-oil supplies with a large reduction in the number of wells drilled in order to conserve materials.

In their professional employment and otherwise, geologists are active in many phases of the war plans, as revealed in the Denver sessions.

Last year the American Association of Petroleum Geologists, by its study of prospective producing areas, paved the way for their exploration in 1942. This year it is coordinating oil-finding methods so as to achieve greater efficiency in adding to the nation's reserves.

The activities of geologists and geophysicists are not confined to exploration for new oil deposits in the United States. At a time when relations with our Latin American neighbors should be firmly cemented in the common good, geologists play an important part in finding and developing deposits of oil and of metals in neighboring countries.

In a nation at war, geologists and geophysicists are prepared to undertake activities of as great importance to the military forces. The location of defense positions, of bridges and of communication systems based on sound geological principles, saves time and lives.

Methods used by geophysicists in the detection of hidden structures are equally efficient in the detection of hidden enemy batteries. The detailed knowledge geologists possess of mineral deposits in all countries of the world can be rapidly applied to military strategy.

But we wonder if this is enough to expect of the industry's largest professional group. We haven't been finding as much oil as we should, and now wildcat work is on the decline. Producing, refining and transportation difficulties will pass, provided we keep on finding new oil. These current problems will be nothing compared to those which will arise if reserves which are being depleted daily are not replaced with new oil.

Oil explorers know more about the why and wherefore of this problem than anybody else. They speak with authority as to what it takes in tools and well-directed effort to maintain a backlog of proven oil sufficient to protect this nation through this emergency and later.

We have a feeling that a representative group should complete additional cooperative studies in order to present a clear picture of what needs to be done in the industry's exploratory operations in this country and elsewhere. Then they should go to Washington, which is giving more and more attention to the nation's scientists in relation to the successful carrying out of the war, and present the facts to those who have the final authority. There's a job to be done, the quicker the better.

Revocation of P-83 Forces Suppliers to Use Form PD-1X

PREFERENCE Rating Order P-83, under which priority ratings have been assigned to many petroleum-equipment supply companies, was revoked April 16 by J. S. Knowlson, director of industry operations, War Production Board. Abolished along with P-83 was its companion form P-82a.

In revoking the supply-house order, the director of industry operations provided for delivery of unfilled orders based on the preference rating and form. "Deliveries already rated pursuant to the provision of this order on Form P-82a," reads the revoking order, "shall be completed in accordance with said rating."

Action was taken, Mr. Knowlson explained, because the supply houses affected may now obtain priority assistance either by extending the ratings on orders received by them from petroleum operators and companies or by applying for preference ratings on the distributors' Form PD-1x. All serially numbered copies of P-83, as issued to individual supply houses, are revoked.

While petroleum industry supplies are not specifically listed on Form PD-1x, most of the types of supplies carried by supply houses fall into the categories to which preference ratings may be assigned on the form. For other types of supplies for which ratings are needed, the supply houses will be required to extend ratings on the orders which they fill.

Originally established to aid suppliers in bringing their inventories up to minimum operating level, P-83 permitted supply houses to obtain materials on a quarterly basis. When WPB issued P-98 and Form PD-1x, there was no further need to continue P-83.

Under P-98, suppliers may maintain a 90-day stock of materials, or the equivalent of a minimum practical inventory. Suppliers may apply ratings to obtain materials scheduled to be delivered to an operator or to replace inventory material that already has been delivered to an operator.

Under no circumstances, however, can a supplier apply for ratings under P-98 if he can make deliveries to the operator and still maintain a minimum practical inventory. If, in making deliveries, the supplier reduces his stock below the minimum inventory, he can use the rating applied by an operator only to the extent necessary to build up the inventory again to a minimum level.

Manufacturers may apply ratings under P-98 to reacquire a minimum practical inventory only if the manufacturer applies the rating before he completes the delivery of materials rated by the operator.

Suppliers, however, may defer application of ratings until they can place a purchase order or contract for the minimum quantity of materials obtainable under their customary terms. This provision was made so that suppliers who get discounts for bulk purchases can continue to obtain their usual terms.

Treasury Launches Attack On Depletion Allowance

WASHINGTON, D. C. — The House ways and means committee late last week heard testimony by Randolph Paul, tax adviser to Secretary Henry Morgenthau, in refutation of statements by the oil industry on retention of the present depletion allowance.

"The Treasury believes that the favored treatment to a particular industrial group involved in percentage depletion should not be retained in an all-out war-tax program," Mr. Paul stated.

"Percentage depletion does not appreciably stimulate exploration and discovery," he declared "It is not essential to the maintenance of the output of stripper wells. Its elimination will in no way endanger the supply of raw materials needed for the war effort. The continuance of the special privilege involved in percentage depletion would allow the oil and mineral industries to escape their fair share of the tax burden at a time when millions of small taxpayers are being asked to save and sacrifice for the winning of the war. The continuance of the provision at such a time cannot but adversely affect the morale of the American taxpayer."

Mr. Paul estimated that at 1942 business levels and proposed 1942 tax rates, the elimination of percentage depletion and the substitution of cost depletion would increase the revenue of the country by $117,000,000 and that approximately 75 per cent of this amount would be accounted for by oil and gas properties.

"Percentage depletion is of no help to the operator who loses his capital in repeated unsuccessful ventures, since he gets the benefit of percentage depletion only if he develops property that yields a net income," Mr. Paul declared.

"On the other hand," he continued, "the operator who engages in both successful and unsuccessful ventures is permitted, both under the present law and the Treasury's proposals, to offset the cost of dry holes and unproductive leases against current income from productive property; he may also carry forward operating losses for 2 years.

"Consequently, even without percentage depletion, provision is made for the offsetting of losses on unsuccessful ventures against gains in successful ventures.

"No satisfactory reason has been offered why one operator should be permitted to recover more than his capital investment because another has lost his capital."

Mr. Paul urged the committee to reduce the present depletion allowance from 27½ per cent to 15 per cent of gross income for taxpayers who elected to charge intangible drilling and development costs to capital account in prior years, and at the rate of 5 per cent of gross income for taxpayers who elected to charge such costs to expense.

"The Treasury has made some studies of percentage depletion and related allowances in the past several years," he testified. "It has given careful consideration to the objections repeatedly advanced against the elimination of these special allowances. These objections have been reexamined in the light of special needs for the war program.

"It is found that the elimination of percentage depletion and the expensing of development costs will not interfere with the war program, will yield about $206,000,000 of revenue, and will remove from the statute a long-standing and inequitable privilege."

W. F. Lowe Elected Chairman Of S.A.E. Southwestern Section

William F. Lowe, Tulsa, secretary of the Natural Gasoline Association of America, was elected chairman of the southwestern section of the Society of Automotive Engineers at the last meeting of the season held in Tulsa April 17. Mr. Lowe had been secretary-treasurer of the section for the past 5 years. He succeeds G. C. Richardson, Cities Service Oil Co., Bartlesville, Okla.

Other officers elected were: Howard Emmons, Braden Winch Co., Tulsa, vice chairman, suceeding H. T. Bennett, Mid-Continent Petroleum Corp.; Arch L. Foster, Phillips Petroleum Co., Bartlesville, secretary-treasurer; J. H. Baird, Lubri-Zol Corp., Tulsa, chairman of the papers committee, succeeding Fred Hunt, Continental Oil Co., Ponca City; and J. R. Corbett, Cato Oil & Grease Co., Oklahoma City, chairman of membership, succeeding Carl Tangner, Diesel Power & Machinery Co., Oklahoma City.

Speaker at the meeting Friday was Al W. Mooney, vice president and chief engineer, Culver Aircraft Corp., Wichita, Kans. Mr. Mooney discussed the general developments in light, private and commercial aircraft with particular reference to postwar developments which will put thousands of these craft in daily use throughout the country.

Magnolia Lifts Pipe-Line Proration in West Texas

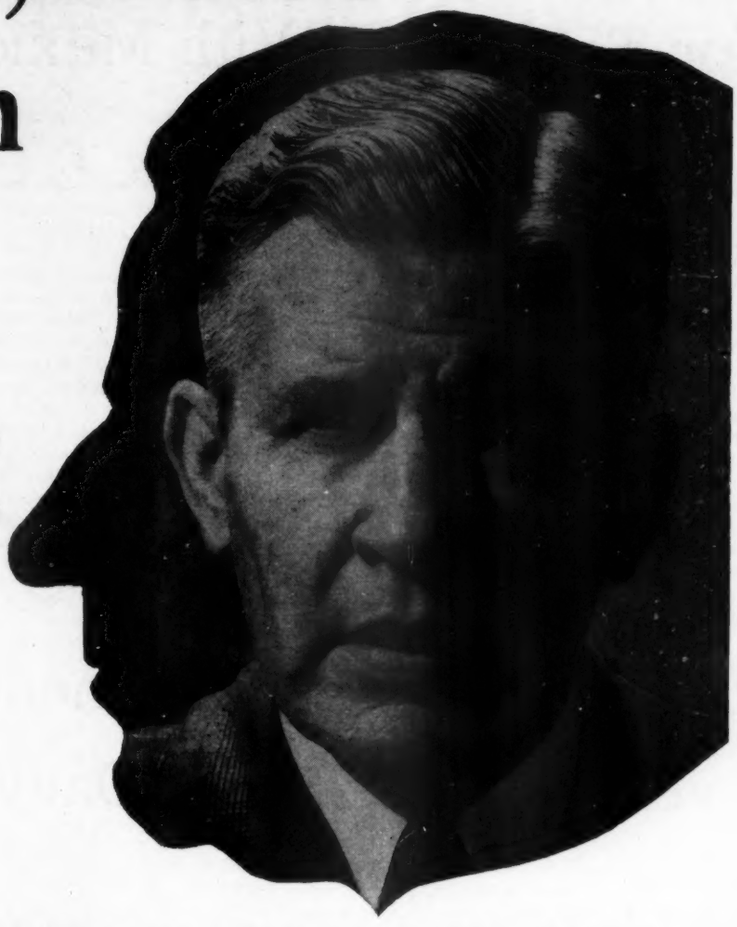
DALLAS, Tex.—Magnolia Petroleum Co. has resumed purchase of full allowables from West Texas producing properties to which it is connected retroactive to April 1. Atlantic also modified its pipe-line proration policy and is now taking full allowable from all Ward County, Texas, connections.

While Magnolia lifted pipe-line proration in West Texas, where the company had been taking only 60 per cent of the allowable for several weeks, it made no changes in its New Mexico purchases where it has been buying 65 per cent of the state allowable.

Magnolia, it was reported here, has arranged to deliver all crude currently purchased in Winkler County, Texas, to Shell Oil Co., Inc. Magnolia is connected to Winkler properties which have an allowable of about 6,000 bbl. daily. Magnolia is also understood to have sold 150,000 bbl. of West Texas crude held in company storage to Shell which will deliver the crude through its northern pipe line. Previously, Shell had taken Humble Oil & Refining Co.'s connections in the Gaines County portion of the Wasson pool and also relieved Atlantic Refining Co. in New Mexico.

Other West Texas purchasers, including Humble, Sinclair Prairie Oil Marketing Co. and Atlantic, had previously abolished or modified their pipe-line proration policies in West Texas.

He Bet $6,800.00 on his own NOSE



JOHN'S NOSE is every bit as good as the next fellow's. He can tell beer from sour milk at the first quick whiff, knows when spring is in the air, and can't resist the call of hunting season when his nose picks up the crisp, faint dried leaf aromas of fall with a touch of wood smoke in the air.

But John's nose was made for only certain kinds of analysis work—it is not a complete laboratory, although he has considered it an infallible core analysis laboratory for lo these many years. On his last well his nose threw him for this $6,800 loss when just the other day he looked at and smelled a richly saturated core and instantly decided with 28 feet of this sand he was taking no risk at all in setting pipe at 4,780 . . . and he did. Testing proved the sand so tight he could never make a commercial well.

Yes, he pulled some pipe, but $3,800 worth of new pipe that he can't salvage remains in the hole, not to mention the $3,000 he spent swabbing and working with his well, trying to make that 28 feet of "the richest saturation I ever saw" produce oil.

Saving pipe and expenses is only one application of Core Laboratories service. Most operators find they can complete better wells than ever before when they have an EXACT picture of bottom-hole conditions with reference to the pay horizon, saturation, porosity, gas content, connate water, contacts of gas-oil and water-oil, shale breaks and other factors and tell an operator how to complete his well for the highest potential production. Write, wire or 'phone nearest office for complete information.

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Oil Companies Study Proposal For Settlement With Mexico

UNITED STATES oil companies this week were studying a joint American-Mexican appraisal commission's report which recommends payment of $23,995,991 for properties expropriated 4 years ago in Mexico. The commission's value compares with claims of American companies that properties taken by the Mexican Government were worth $150,000,000 to $200,000,000. Mexico contended that they were worth no more than $10,000,000 to $15,000,000.

Arrangements for the joint-commission appraisal were made by the Department of State and the Mexican ambassador to the United States. Findings are not binding on the oil companies, although strong pressure has been exerted from Washington, insisting upon a settlement.

Morris L. Cook, Washington and New York engineer, represented the United States and Manuel J. Zebada was the Mexican member of the commission. They allocated the $23,995,991 among the various claimants as follows: Standard Oil Co. (New Jersey) group, $18,391,641; Standard Oil Co. of California group, $3,589,158; Consolidated Oil Co., $630,151; Sabalo group, $897,671; and $487,370.

Recommendation was made that payment be tendered by the Mexican Government as follows: One-third on July 1, 1942, and the balance in five equal annual installments.

Arrangements proposed by the commission provide that the money shall be paid by Mexico to the U. S. Government. Before the funds are distributed to the oil companies, the expropriated concerns shall deliver all documents and instruments of title to the Mexican Government.

Sinclair interests settled claims in Mexico in 1940 by direct negotiation with the Government and received $8,500,000 for its properties.

No provision was made in the American-Mexican negotiations for settlement of the Royal Dutch-Shell claims which represent approximately as much again as the United States interests, centering around the Poza Rica field, the most prolific area in Mexico.

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Eastern Railroad Shipments Average 586,325-Bbl. Daily

WASHINGTON, D. C. — Another decline of 1,357,000 bbl. in stocks of all oils on the East Coast developed despite an increase of 11.5 per cent in tank-car consignments to that area averaging 586,350 bbl. daily during the week ended April 11.

In moving the new record volume of oil by railroads, the 20 reporting companies loaded a total of 18,243 cars. Including cars which were being returned to loading points, there were approximately 43,500 engaged in serving the East Coast.

Oil shipments by rail from California to the Pacific Northwest also increased during the week by about 12 per cent. The seven companies participating in the Northwest rail movement reported loading 566 cars during the week compared with 504 in the week ended April 4. The average daily movement by tank cars from California was approximately 18,200 bbl. It is estimated that 1,250 cars are engaged now in the Pacific Northwest service.

Products Drop Most

Most of the decline of the East Coast petroleum stocks was in products which dropped 1,115,000 bbl. Crude stocks declined 242,000 bbl., including oil in pipe lines. East Coast stocks of all oils totaled 45,638,000 bbl. on April 11.

Eastern shipments by reporting companies for the week ended April 11 were: American Mineral Spirits Co., 60 cars; Atlantic Refining Co., 2,272; James B. Berry Sons, Inc., 3; Chalmette Petroleum Co., 47; Cities Service Oil Co., 740; Continental Oil Co., 98; Gulf Oil Corp., 1,312; Hartol Products, 114; Pan American, 1,268; Petrol Corp., 202; Petroleum Heat & Power Co., 38; Pure Oil Co., 122; Shell Oil Co., Inc., 957; Sinclair Refining Co., 1,468; Socony-Vacuum Oil Co., 2,753; Standard Oil of Kentucky, 135; Standard Oil of New Jersey, 3,469; Sun Oil Co., 832; Texas Co., 2,012, and Tide Water Associated Oil Co., 341.

Pacific Northwest shipments were: General Petroleum, 53 cars; Richfield, 48; Shell Oil, 171; Standard of California, 142; Texas Co., 25; Tide Water, 69; and Union Oil Co. 58.

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Conservation of Materials Reviewed at P.I.E.A. Session

SHREVEPORT, La.—The need for conserving material and manpower particularly in this emergency period was recognized as a vital concern of the industry at the annual convention of Petroleum Industry Electrical Association held here April 22 and 23.

The Cathodic Section of the association had a prominent place on the program. Papers presented information gathered throughout the industry regarding the technology, operation and maintenance of cathodic-protection equipment.

Economic aspects of cathodic protection were discussed in two papers. N. C. McGowen, president, United Gas Pipe Line Co., addressed the general meeting of corrosion engineers and members of the P.I.E.A. on "Cathodic Protection and Corrosion From Management's Viewpoint" and presented information obtained through the experience of his organization with large-scale applications. L. F. Scherer, assistant chief engineer, Texas Pipe Line Co., dealt with "Economic Justification of Cathodic Protection."

William E. Huddleston, corrosion engineer, Cities Service Gas Co., discussed insulation, segregation and isolation of protected and unprotected structures in a paper on "When and Where to Use Insulating Flanges." Donald H. Bond, corrosion engineer, Texas Pipe Line Co., offered corrosion engineers information on ways of improving the operation of equipment in "Maintenance Requirements for Adequate Operation of Cathodic Protection Equipment."

There were three papers dealing with refinery and tank-farm protection. V. L. Nealy, corrosion engineer, Texas Co., in his paper, "Corrosion Problems on Refinery Equipment," illustrated the application of electrical protection to processing equipment. Derk Holstein, corrosion engineer, Shell refinery, in his paper, "Current Density Determinations on Refinery Piping," presented another method of determining when you have adequate protection. R. A. Brannon, corrosion engineer, Humble Pipe Line Co., discussed "Cathodic Protection of Tank Farms."

Officers of the association in charge of the meeting were C. O. Diller, Lone Star Gas Co., president, L. G. Wainman, El Paso Natural Gas Co., vice president, and J. F. Colerain, Houston Pipe Line Co., secretary and treasurer. F. P. O'Connor, Stanolind Pipe Line Co., chairman of the membership committee, reported rapid increase in members and scope of activities of the association in the past few years.

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Oil-Container Conservation Program Approved by OPC

WASHINGTON, D. C.—Revised plans for the conservation, standardization, and substitution of oil drums and other metal containers used in the marketing of petroleum products were approved Tuesday by the Office of Petroleum Coordinator.

In announcing approval of the revised plans, which had been drafted by the national containers subcommittee of the Petroleum Industry War Council, Deputy Coordinator Davies urged all marketers and consumers, whether urban or agricultural, to cooperate with the provisions of the plans by quickly returning oil drums and other metal containers to their petroleum suppliers.

"Containers are made of citical materials. New containers are increasingly difficult to obtain. Every oil drum in use can be made to do the work of four drums in normal times if all consumers will cooperate by returning the containers as soon as they are emptied," he stated.

The plans provide that petroleum companies shall hereafter require deposits on reusable containers at the time of sale.

Minimum deposits fixed were: $4 for the 55-gal., 18-gage light-steel drum and the 400-lb. grease drum; $3 for the 30-gal. light-steel drum; $2 for the 14-gal. steel drum and the 100-lb. steel grease drum; and $10 for I.C.C. 55-gal. heavy-steel drum.

Four Gulf Coast Refiners Form Rubber Company

BEAUMONT, Tex.—Announcement was made here of the formation of the Neches Butadiene Co. which will build and operate a large plant for the manufacture of butadiene in this area. The new company is jointly owned by the Magnolia Petroleum Co., Gulf Refining Co., Texas Co., and the Pure Oil Co., all of which have refineries in this section. Herbert Henderson of the Gulf Refining Co., Pittsburgh, Pa., is president of the new company.

The refineries of the four companies will supply butene and butane which will be used in the manufacture of the butadiene. The new plant will be financed by the government.

A similar project was recently announced for the Chicago area by the Standard Oil Co. of Indiana, Sinclair Refining Co. and the Cities Service Oil Co. The Dow Chemical Co. will also participate in this program and the output of the plant will be buna rubber.

Candid Appraisals of Industry War Position Given N.P.A.

By J. P. O'DONNELL

CLEVELAND, Ohio.—Two of the most candid public appraisals of the tremendous task facing the oil industry in supplying the wartime needs of the United States and its allies were given the 400-odd oil men who attended the thirty-ninth semiannual meeting of the National Petroleum Association here April 16 and 17. These appraisals were summarized in the statement of Dr. John W. Frey, director of marketing, Office of Petroleum Coordinator, who advised the industry to "imagine the worst possible thing that can happen and prepare for that." A more detailed analysis of some of the problems, particularly as they affect refining, was given by Wright W. Gary, director of refining, OPC, who also praised the remarkable progress of the industry in meeting the demands for 100-octane gasoline.

Talks by Dr. Frey and Mr. Gary furnished the highlights of a timely program which also included discussions of the effect of conversion of the automobile industry and the rubber shortage on the oil business and others on the fuel and lubricating problems of the Army and Navy.

Discuss Consumer Rationing

The imminence of consumer rationing was mentioned by Dr. Frey in discussing restriction of gasoline distribution and closing of service stations. "I am inclined to believe," he said, "that in the next 3 or 4 weeks a sort of stopgap form of card rationing will be put into effect to be followed by a more elaborate form of coupon rationing later in the summer." He declared that rationing is definitely coming under the OPA since more oil is needed than can be brought into the East Coast and "we must cut the pattern to fit the cloth available."

Most heartening of Mr. Gary's statements was that through cooperation among refiners, allocation of raw materials and use of better base stocks, the production of 100-octane gasoline from existing facilities has been almost doubled in the last 3 months. Furthermore, an increase of over 500 per cent in capacity is now under way, either actually building or in the engineering stage. In addition, there are new secret compounds which, added to the fuel, enable our planes to fly increasingly higher, faster and longer and to carry greater loads.

Due to specification changes it is hard to estimate what ultimate production will be, Mr. Gary said. These changes have resulted from actual combat experience and as a result better fuel is being produced now than last summer when a rich-mixture performance was not available. The program is now ahead of the proposals authorized by the WPB and the Army, Mr. Gary said. He urged that more proposals be submitted by oil companies because ceilings do not last long and because some of this gasoline will be lost as tankers are sunk, refineries may be bombed or sabotaged and some processes may not be as good as expected.

Mr. Gary began his talk with an explanation of the functions of the five divisions of the Refining Section of OPC. They are: (1) Supply, concerned with the manufacture of products; (2) operations, many of the problems of which have been occasioned by transportation difficulties necessitating revisions in yields; (3) new facilities, concerned with preparing plans, negotiating contracts, furnishing capital when necessary; (4) equipment, which parallels oil-company construction departments; and (5) process development, necessitated by the fact that few refiners are acquainted with processes needed today.

Gulf Coast in State of Flux

Operations are normally geared to the refinery's market, Mr. Gary said, but today "we are in a state of flux." This is particularly true of the Gulf Coast where large excesses of motor gasoline are accumulating with storage in some instances within 24 hours of being full thereby necessitating curtailment of operation. There refineries have been divided into four classes: A, those making war materials; B, those making 91-octane gasoline; C, those supplying lease-lend requirements; D, all others. He expressed the hope that all may be kept running but foresaw the possibility of refineries in other than the preferred classes having to shut down. In this case transportation will be pooled and other steps taken to insure protection of the shutdown plants, he said.

He praised the cooperation of the Gulf Coast refiners and their willingness to sacrifice. He cited the case of one refinery which has reduced its runs to 60 per cent, is bringing in a particular cut from another plant for the manufacture of toluene, has changed the vapor pressure of its gasoline to recover isobutane and is making every effort to produce more olefins.

While the situation is now most critical on the Gulf Coast, Mr. Gary indicated that East Coast area would next experience a similar situation. The problem now is what to bring into the East Coast where production of 100-octane gasoline must be maintained but where shipments of special cuts or special crudes must be kept to a minimum.

N. H. Weber, president of the N.P.A. and vice president of Pure Oil Co., presided at the meeting

Maximum production of essential war materials must be maintained and military authorities have asked that byproducts be destroyed or put back into the ground, if necessary. This will necessitate price adjustments among heavier products and, Mr. Gary said, the OPC is making every effort to obtain more equitable prices. He said that one Gulf Coast refiner is taking a loss of close to $1,000,000 a month in order to maintain production of essential material. In addition to the increased costs due to loss of profit products there are increased transportation outlays which he described as terrific.

Regarding synthetic rubber, Mr. Gary said while it can be produced by either oil or chemical companies, the latter cannot do so in volume and the former are better suited since the production of needed material represents a subtraction from their normal operations. Both butadiene and styrene, the principal ingredients of Buna-S rubber, are available from petroleum. An attempt is being made now to determine if it will be possible to produce synthetic-rubber materials from present facilities. It is possible that since some refineries will necessarily be closed because of reduced motor-fuel demand, they will be assigned the task of producing raw materials for rubber.

May Divide Cuts

Both toluene and benzene are growing in demand and in order to insure sufficient production the possibility of dividing cuts, sending them from one refinery to another for the production of special products, may be undertaken. Benzol is also much in demand and restrictions on its use in motor gasoline will be imposed soon. It is advantageous for manufacturing 100-octane gasoline and it will be used for this purpose later this year. Changes, which should take effect in July, will also alow the utilization of more aromatics. Benzene's great need is in the production of phenols and nylon, the latter to be used in parachutes. Mr. Gary expressed belief that the oil industry would be able to meet the needs for these special products without too much construction.

After stating that 2 dozen major companies and half again as many independents are engaged in producing aviation gasoline, Mr. Gary expressed satisfaction with the economics of this production, saying that the independents' price was no higher than that of the majors. He predicted a substantial postwar demand for 100-octane gasoline by cars which are now being designed to utilize such fuels and by a vastly expanded aviation industry.

In discussing the priorities problem, Mr. Gary explained that the recent WPB order limiting new construction relieved concern over PD-25-A which "does not apply to oil." The most dis-

couraging feature is that allocation of material is necessary after an A-1-A rating is obtained. He suggested that oil companies "engineer around" critical materials as much as possible by such measures as accepting less heat efficiency through a limiting of exchangers, cutting out chrome and nickel alloy uses and abandon the long-life factor. He pointed out that the bulk of the building is now near its peak and that it may taper off, releasing more production capacity. He also urged scrap collection but emphasized the importance of prior salvage in view of the shortages existing in such things as valves.

The industry must cut down on its consumption of chemicals, Mr. Gary said. He suggested the elimination of sweetening, and advised less consideration for sulfur specifications. He spoke optimistically of the tetraethyl lead situation, saying the inventories had been increased to above normal, owing in some part to the decrease in gasoline consumption.

Demand for aviation lubricating oil will probably double by the end of 1942 and possibly be another 70 per cent higher by the end of 1943, Mr. Gary said. He said that the situation in this respect is not so tight as it had seemed. The single heavy duty, all purpose lubricant sought by the Army will probably fall into the range of 65 to 75 v.i., will be required to pass the General Motors and Caterpillar tests, will need additives and will be needed in large quantity.

Pleads for More Realism

Dr. Frey declared that the industry must be more realistic. He said that marketing in war is not merchandising but a matter of having what is needed where and when it is required. Among the various restrictive measures he discussed was the banning of oil burner installations in District 1 and in the northwest. Work on reducing the quantity of burning oil required has resulted in a cut of 6,500,000 bbl. per year. Circulars have been sent out urging conversion to coal wherever possible, a step which must be pursued to the maximum or "there will be cold homes this winter."

Recommendations covering containers have been reworked and will be released soon. These will cut down the use of small cans for general purposes, will continue to allow 1-qt. and 5-qt. cans but with the ratio of the larger cans increased. These recommendations will also simplify drum regulations. Faster circulation of drums was urged by Dr. Frey and he criticized the reaction of some companies to previous recommendations which was not entirely satisfactory.

The belief that a 50 per cent reduction in gasoline consumption without affecting basic business conditions is possible was expressed by Dr. Frey. He repeated his earlier caution that it would be "better to prepare for the worst." In reply to a question regarding the existing overabundance of gasoline in western Pennsylvania, he dismissed any concern with the remark that it may have considerable value in the near future.

Other general sessions speakers included N. H. Weber, vice president of the Pure Oil Co. and president of the association, who urged divorcement of politics from the war effort; Sen. H. H. Burton of Ohio who called for a reduction in nondefense expenditures by the Government, and Hanson W. Baldwin, military and naval correspondent of the New York Times.

Mr. Baldwin presented a study of the relative positions of the United Nations and the Axis powers and concluded that the crisis in the war would be experienced this year, intimating that if the United States and its allies managed to stave off an imminent desperate all-out effort by their enemies the preponderant industrial power of this country would enable the anti-Axis to win.

War-Quality Fuels to Become Standard When Conflict Ends

CLEVELAND, Ohio.—Effects of converting the automobile industry to full-scale war-materials production and the rubber shortage on the oil industry are likely to be, first, a substantial reduction in gasoline consumption and, later, a new and general demand for the better motor fuels that are being developed and produced as a result of the conflict. These opinions were expressed by Dr. C. L. Burrill, director of the statistical division, department of economics, Standard Oil Co. of New Jersey, and by George Romney, managing director, Automotive Council for War Production, during a symposium at the National Petroleum Association's semiannual meeting.

Dr. Burrill admitted that many assumptions must be made to estimate the effect of the rubber shortage on the petroleum industry. From the basis of the worst possible assumption, that no rubber will be available for the 28,000,000 passenger cars until the war is over, he estimated that the number of vehicles on the roads may decline to 25,200,000 in 1943, to 17,700,000 in 1944, to 6,800,000 in 1945, and to 1,400,000 in 1946. If this were the case, he predicted that motor fuel consumption by these cars would decline from 428,000,000 bbl. in 1941 to 354,000,000 in 1942, 290,000,000 in 1943, 161,000,000 in 1944, 52,000,000 in 1945, and to 5,000,000 bbl. in 1946. If 50 per cent of the tires are recapped he envisaged a more gradual but still drastic decline to 9,100,000 cars by 1946 and to 82,000,000 bbl. of gasoline.

Synthetic Rubber Only Salvation

One thing is certain, Dr. Burrill said, the United States cannot afford to have 28,000,000 vehicles go off the road. Apparently, he continued, the supplies of crude rubber can be substantially increased only by additional synthetic capacity. He estimated that if additional Buna-S capacity of 200,000 long tons is made available by 1943, all of the vehicles still able to run could be provided with tires of approximately the same quality as they now have. He emphasized the immediate need for expanding synthetic capacity since the peak to be required depends partly upon the speed with which it is obtained.

The cost per passenger vehicle of obtaining sufficient synthetic rubber to supply all cars is surprisingly low, Dr. Burrill said. A common figure used to represent the cost per ton per year of Buna-S is $1,000. Therefore an investment of $100,000,000 would be required to obtain 100,000 tons per year. If 300,000 tons are required, the capital cost would be $10.70 per vehicle. Approximately 110,000 short tons of steel would be needed to build 100,000 tons of capacity, representing less than 1 day's output of finished steel. If butyl rubber were used, cost per ton and steel requirements would be considerably less.

Because remaining vehicles, chiefly trucks, will consume more gasoline and export and aviation demands will grow, the overall demand for gasoline should not show an appreciable decrease until 1944. Dr. Burrill estimated that "under the conditions where none of the passenger vehicles could obtain rubber, the total demand for gasoline, expressed as a percentage of the year 1941, will be as follows for the next 5 years: 1942, 94 per cent; 1943, 95 per cent; 1944, 83 per cent; 1945, 69 per cent, and 1946, 64 per cent."

The deficiency of facilities for moving petroleum products in the Western Hemisphere may cause more serious restriction in consumption during 1942 than shortages of rubber, Dr. Burrill said. Transfers of tankers out of the hemisphere, losses in efficiency plus possible further sinkings may make it necessary to restrict gasoline consumption more severely during the current year than any reduction that users could be expected to make because of rubber.

Much of Mr. Romney's talk was devoted to a description of the war production achievements of the automobile industry. He prefaced remarks with the statement that studies show that 56 per cent of the automobile usage is necessary and that, therefore, there is a large dispensable proportion. He described how the exchange of information and equipment has enabled the industry to move well ahead of the goals set by the Army and Navy and by the president. Tooling up has been virtually completed, he said, and production of every item is either in production or ready to start production on a vast scale.

Mr. Romney mentioned postwar possibilities. He said that while research laboratories had ceased work on passenger-car improvements months ago, technical advances are most rapid at times like these under the influence of necessity. The advances made today, particularly in aviation engines, will be incorporated in the car of tomorrow.

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Eastern Retailers Given Margin-Computing Rules

WASHINGTON, D. C.—Instructions were issued last week by the Office of Price Administration to eastern retail gasoline dealers on computation of the 3-cent margin permitted under Amendment 2 to temporary Price Regulation 11.

Amendment 2 applies only to retailers who have been operating on a margin of less than 3 cents per gallon.

The explanation declares that only the price paid by the retailer to his supplier, and the tax, may be considered in fixing a base upon which to impose a 3-cent-per-gallon margin. All other charges which are not for gasoline must be excluded.

Temporary Price Regulation 11, made effective March 23, 1942, froze retail prices for gasoline in the curtailment area at levels prevailing on March 13, 1942. Because of higher transportation costs to the affected area, Amendment 1, issued March 26, permitted retailers in the area—with the exception of those in Georgia and in Florida east of the Apalachicola River, and in Oregon and Washington—to add 0.5 cent per gallon to the established maximum prices.

A preliminary field study by the OPA subsequently revealed that some retail dealers were operating on a margin of less than 3 cents per gallon. Amendment 2 was issued, therefore, permitting the retailers to increase their margin to 3 cents, but no more, even though the resultant price exceeds that which prevailed on March 13, 1942.

The OPA decision is that the cost of gasoline to the retailer, as considered in temporary Price Regulation 11 and its amendments, is the actual cost of these products paid to his supplier, including taxes. No other costs of the service station may be added to this base.

Texas Oil Men Are Honored

SAN ANTONIO, Tex.—Approximately 500 oil men and business men of South Texas attended the fifth annual oil men's meeting here April 17, which was sponsored by the South Texas Chamber of Commerce.

The 1-day meeting included a golf tournament and was climaxed with a banquet Friday evening in which special tribute was paid to Harry C. Wiess, Houston, Tex., president of the Humble Oil & Refining Co., and W. M. Griffith, Sinton, Tex., vice president and general manager of the Plymouth Oil Co., who were honored guests for the meeting. Silver plaques were presented to the guest of honor by Lt. Col. Ray Leeman of San Antonio, executive vice president of the South Texas Chamber of Commerce, in testimony of their outstanding services to the oil industry.

Speakers at the banquet included Frank Carothers of Houston, vice president of the Norvell Wilder Co.; Al Buchanan, of San Antonio, independent operator and drilling contractor, and Lt. Col. Ray Leeman.

The guests of honor were introduced by former governor W. P. Hobby of Houston, Tex., and Tom Graham, independent operator of Corpus Christi, Tex.

Chairmen of the various committees in charge of the meeting were Al Buchanan, arrangements; Marrs McLean, reception; John J. O'Hern, golf, and Frank B. Lefevre, entertainment.

Upper left: H. C. Wiess, Houston, Tex., president of Humble Oil & Refining Co., has just been presented a silver plaque by Col. Ray Leeman, executive vice president of the South Texas Chamber of Commerce, San Antonio, Tex. Upper right: Colonel Leeman presenting plaque to W. M. Griffith, Sinton, Tex., vice president and general manager of Plymouth Oil Co. Bottom: View of head table and part of the group in attendance at the fifth annual South Texas Oil Men's meeting. Pictured at the head table are: James Anderson, vice president, Humble Oil Co., Houston; Paul Benedum, Houston; George Sawtelle, president, Texas Mid-Continent Oil and Gas Association, Houston; F. M. Frasher, president, Duval Oil Corp., San Antonio; Col. C. K. Nulsen; former Gov. W. P. Hobby, Houston; Tom Graham, Corpus Christi; H. C. Wiess; J. S. Leach, vice president, Texas Co., Houston; Mayor C. K. Quin of San Antonio; Colonel Leeman; D. E. Blackburn, president, South Texas Chamber of Commerce, Victoria; Al Buchanan, San Antonio; Maj. Gen. Richard Donovan; O. W. Killam, Laredo; W. M. Griffith; H. R. Cullen, Houston; Col. C. L. Middleton; Marrs McLean, San Antonio; J. M. Pickering, chairman of the board of the South Texas Chamber of Commerce; Maj. D. E. Bradford; George A. Hill, Jr., president, Houston Pipe Line Co., Houston; E. J. Sadler, vice president, Standard Oil Co. of New Jersey; and A. Wayne Wood, Brownsville

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Ritchie Field Crude-Price Advance Authorized by OPA

WASHINGTON, D. C.—To correct a subnormal price for crude in the Ritchie field, Acadia Parish, Louisiana, maximum prices for that pool are increased by Amendment No. 7 to Revised Price Schedule No. 88 issued by Price Administrator Leon Henderson.

The amendment, effective April 23, permits a price of $1.18 per barrel for crude petroleum of 25° gravity and $1.20 per barrel for 26° gravity, in contrast with a flat price of $1.08 per barrel previously. The $1.08 price prevailed on October 1, 1941, the price date selected in fixing maximums under the price schedule.

When the Ritchie field was opened and the production of low-gravity crude began, its output was bought by the only refinery having a pipe-line outlet available. Because of the low gravity of the product, it was necessary for the refinery, which concentrates on gasoline extraction, to commingle it with crude of higher motor-fuel content.

The low-gravity crude, however, is adapted to the production of lubricants. Because of this fact, a second refinery, which concentrates on extraction of lubricating oils, agreed to buy the output for use in making lubricants at the same price it paid for similar grades of Texas and Gulf Coast crudes.

Producers in the Ritchie field and the second refinery petitioned the OPA to amend the price schedule to permit higher prices.

Motor Vehicle Administrators Pledge Cooperation in Moving Oil

EXCELSIOR SPRINGS, Mo.—Motor-vehicle administrators in 11 middle western states and Manitoba, Canada, at a meeting held here April 16 pledged their cooperation in facilitating the interstate movement of crude oil and petroleum products by trucks. The meeting was held under the auspices of Region 3 of the American Association of Motor Vehicle Administrators. In a formal resolution the association went on record "as recommending to the several states the adoption of motor tank-truck transport regulations which will promote the efficient utilization of existing facilities, for the duration of the present emergency." The cooperation planned for the future includes the lifting of license restrictions, fees and taxes, maximum capacities and weight and specification limits of motor truck equipment in interstate shipments.

The action was taken after Boyd Wilson, a member of transportation department staff of OPC at Washington, had explained the serious tanker transportation situation and the necessity of the states cooperating so that the petroleum industry could obtain the maximum use of its motor transportation facilities. Walter Dumont, director in charge of transportation for District 2 of OPC with headquarters at Chicago, attended the meeting.

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THE MARKETS*

CRUDE OIL: An upward adjustment of 10 to 12 cents per barrel in the Ritchie field of Louisiana was authorized this week by the Office of Price Administration. Gulf Refining Co. posted prices of $1.18 for below 50° gravity crude in the Chapel Hill, Texas, field and $1.30 for all oil above that grade. Prices in other parts of the country are steady at unchanged levels.

REFINERY PRODUCTS: A slightly firmer tone exists this week in the motor-fuel markets of the Mid-Continent. Gulf prices are steady but gasoline is offered at concessions by some refiners. East Coast prices are firm at the top permitted by OPA. Transportation costs continue to rise, holding prices firmly against the ceiling.

TANK WAGON AND POSTED DEALER: Market unchanged. Dealers in East Coast area given formula for computing maximum margin of 3 cents per gallon over cost of products. OPA specifies that operating expenses must not be included.

FINANCIAL: Petroleum securities continued their drift, touching new lows for the current movement. Average of 30 representative stocks for week ended April 18: High, 20.23; low, 19.42; close, 19.57. Week ended April 11: High, 20.79; low, 20.02; close, 20.12.

*Details in market section.

International

Mexico . .

National Oil Agency Shows Increase in Production

SUBSTANTIAL increases in Mexico's petroleum production is shown in reports covering Petroleos Mexicanos operations in January and February which were released last week. Production statistics do not include operations of independent firms who are still in private possession of Mexican properties. Production, including natural gasoline, averaged more than 137,000 bbl. daily during the first 2 months of this year compared to 109,000 bbl. daily in the same period of 1941.

Petroleos Mexicanos, the Mexican Government petroleum agency which now operates expropriated properties along with those nationalized prior to 1938, produced 136,843 bbl. daily in January. Rate of withdrawals increased to 138,529 bbl. in February.

Negotiations have reached advanced stages between Mexico and the United States for a loan that will permit expansion of the Central American country's oil exploratory and refining programs this year. Mexico is seeking equipment for repair and expansion of its refining facilities which have suffered from depreciation and obsolescence since expropriation.

Production figures for the first 2 months of this year compared with similar figures for 1941 are shown in the accompanying table.

PETROLEOS MEXICANOS PRODUCTION

(Figures in barrels)

Field—	1941	1942
January		
North Tampico	447,815	576,378
South Tampico	304,395	395,175
Poza Rica	2,517,930	2,784,583
Isthmus areas	508,195	485,991
Total	3,778,335	4,242,127
Daily average	121,882	136,843
February		
North Tampico	301,895	456,144
South Tampico	239,328	253,355
Poza Rica	1,667,291	2,751,881
Isthmus areas	461,108	417,430
Total	2,679,622	3,878,810
Daily average	95,701	138,529

Australia . .

Horizontal Drilling Is Being Used Extensively

THE commonwealth government has adopted the horizontal-well method of developing and producing oil and operations under this program have been started. Free use of the horizontal-drilling patents has been extended to Australia and the royalties collected will be utilized to establish and maintain a Commonwealth Geological Survey.

A survey of conditions in Australia indicates that worthwhile production is obtainable by the horizontal method of drilling. In the first installation, 24 horizontal wells, each ½ mile long, will be drilled.

To improve the gasoline situation locally, it is proposed to drill long horizontal holes from mine workings in some of the gassy coal seams, to pull a high vacuum on these holes and to utilize the recovered gas as a motor-fuel substitute. The degasification development is under way and the gas therefrom is being carried in bags on local trucks, pending the time when high-pressure drums will be available. Each 115 cu. ft. of this methane gas is equivalent to 1 gal. of 100-octane gasoline. The first installation is expected to yield the equivalent of about 20,000 gal. of gasoline per day.

Installations now being made in Australia and the longer-range program were outlined by Leo Ranney, New York, foremost exponent of horizontal drilling in the United States. Mr. Ranney completed his preliminary work in Australia and returned to the United States before the Japanese attack on Pearl Harbor.

War censorship prevents disclosure of more details on location of the horizontal operations and more exact status of the program.

Argentina . .

Production Increases To Rate of 64,556 Bbl. Daily

HIGHER production from Argentina's fields during the first 2 months of this year extends a trend that has characterized operations there for several years.

Production during January and February, including output both by private companies and Y.P.F., the government oil agency, totaled 3,808,810 bbl., an average of 64,556 bbl. daily. In the same 2 months in 1941, Argentina produced 3,510,028 bbl., an average of 59,492 bbl. daily.

Y.P.F. properties produced 2,455,833 bbl. in the first 2 months this year and private companies contributed 1,353,695 bbl. to the total. The trend of increasing production from Government operations and declining recovery by private companies is growing more pronounced with passage of time.

Spain . .

Venezuelan and American Companies to Supply Oil

COOPERATION with Spain to supply a certain quantity of the oil needs of that country, which is said to be suffering an acute petroleum shortage, is reported to be under way. American representatives are said to be enroute to check arrivals at Spanish ports of American and Venezuelan oil, and to see that the oil is utilized strictly for Spanish needs.

Oil trade circles in New York are of the belief that most of the Spanish requirements will be supplied from Venezuela, with the exception of such products as lubricating oils and petroleum wax. Such shipments would be in addition to exports of Spanish royalty oil from Venezuelan fields. The Spanish national oil company owns a royalty interest under the Quiriquire field in eastern Venezuela and under one of the Lake Maracaibo producing areas.

A number of new oil tankers are now under construction in Spanish yards, it is reported. These ships and existing tankers in the Spanish merchant marine will be utilized exclusively to transport the oil, which will be unloaded at Teneriffe.

United Kingdom . .

Production to Recede From 1941 High Record

PRODUCTION of crude petroleum within the British Empire reached an all-time-high record of 54,956,000 bbl. in 1941, according to a recent survey. Trinidad has continued to be the largest single producing colony in recent years and in 1941 yielded a record of 21,211,000 bbl., or 38.6 per cent of the empire total.

Canadian output also reached a high mark in 1941 or 10,003,000 bbl., making the country the second largest empire producer. Burma contributed 7,762,000 bbl. in 1941, while Sarawak, which has since fallen to the enemy, produced 1,312,000 bbl.

The following table shows British Empire crude-oil production during the past 3 years, by countries:

(Figures in barrels)

	1941	1940	1939
Trinidad	21,211,000	20,219,000	18,270,000
Canada	10,003,000	8,718,000	7,838,000
Bahrein Island	6,846,000	7,095,000	7,589,000
Brunei	5,552,000	5,729,000	5,767,000
British India	2,270,000	2,250,000	2,332,000
Sarawak	1,312,000	1,137,000	1,330,000
Total	54,956,000	53,059,000	51,999,000

Although some loss in empire output is expected in 1942 due to the war, material expansion of Canada's oil output is in progress. Production in that country recently topped 30,000 bbl. daily.

Bolivia . .

Brazil and Argentina To Receive Bolivian Oil

A DEAL was recently closed for the shipment of oil from the Bolivian fields on the east flank of the Andes Mountains into Argentina and Brazil. Shipments will be subject to the extension of Argentine and Brazilian railroad facilities to the Bolivian fields. This new railroad construction is said to be under way.

The transaction contemplates a substantial increase in Bolivian oil output. Argentina, according to trade reports, will undertake to supply additional drilling and refining equipment.

The Bolivian fields were purchased early this year from the Standard Oil Co. in settlement of a dispute over the expropriation of American holdings by the Bolivian Government in 1937.

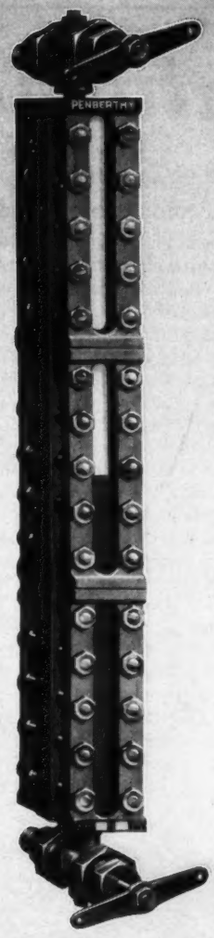
Peru . .

Eastern Field May Ship To Brazilian Refinery

AN independent producing company which has developed production of about 500,000 bbl. annually in eastern Peru, near the Brazilian frontier, is reported to have completed a deal with the Brazilian Government for supplying a substantial quantity of petroleum over a period of years.

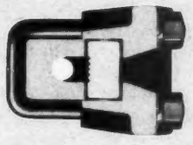
According to the plan, the crude oil will be shipped by barge down the Amazon River and its tributaries to a Brazilian refinery near Rio de Janeiro, a distance of about 2,000 miles.

QUALITY UNCOMPROMISED



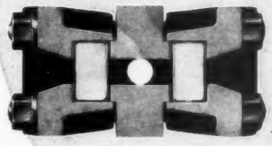
PENBERTHY
Reflex
DROP FORGED STEEL LIQUID LEVEL GAGES

Liquid shows black—empty space shows white. Preferred wherever liquid level must be easily and positively visible . . . and when liquids are under high pressure or at high temperature.

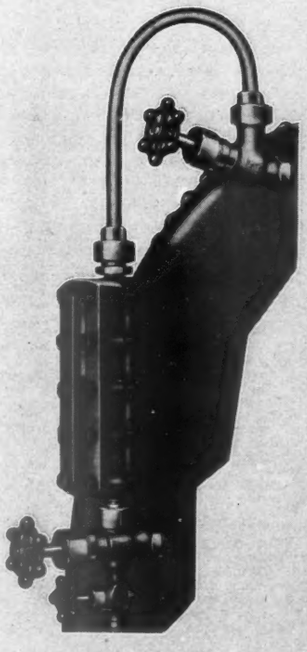


PENBERTHY
Transparent
DROP FORGED STEEL LIQUID LEVEL GAGES

Used to observe color and density of liquids under high pressures, and/or temperatures. Construction is exceptionally rugged . . . similar to Reflex types.



Penberthy Liquid Level Gages



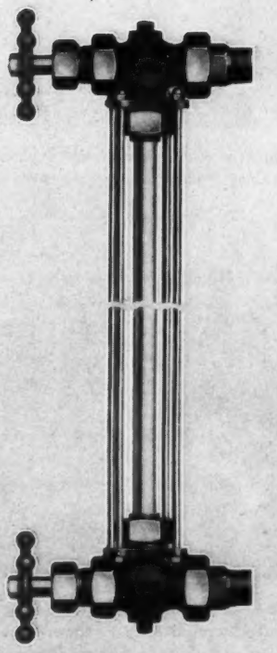
ALL PENBERTHY GAGES
CONFORM WITH A. P. I.—A. S. M. E. REQUIREMENTS

PENBERTHY
Reflex
WATER GAGE SET

Water shows black—steam shows white. U-bolt construction is strongest and simplest to service. Glass replaced by simply removing nuts on face of gage . . . unnecessary to work between gage and boiler.

PENBERTHY
DROP FORGED STEEL LIQUID LEVEL GAGES

Made of Chromium-molybdenum alloy temperature-resisting steel, extra heavy throughout. Stainless steel trimmed. Tubular glass type gages also available in various other metals suitable for practically all conditions.



PENBERTHY INJECTOR CO.
DETROIT, MICHIGAN • Canadian Plant: Windsor, Ontario

PENBERTHY PRODUCTS

Natural Gas News

First Phase of Testing and Sampling Project Completed

Production and plant engineers from all sections of the Southwest dealing with high-pressure gas properties last week observed completion of the first phase of the sampling and testing project of the Natural Gasoline Association of America. Numerous tests were conducted at the same well near Kingsville, Tex., for the purpose of comparing the results of portable sampling and testing equipment against data obtained from full-scale separation.

Elaborate and varied testing equipment was installed at a well owned by the Chicago Corp., under the direction of H. L. Oder, Cities Service Oil Co., Bartlesville, Okla., who was loaned to the N.G.A.A. for the testing project. The well was connected through a 2,500-lb. separator furnished by Black, Sivalls & Bryson. Numerous testing and operating companies, educational institutions and others furnished equipment, including Henderson Engineering Co., Alice, Tex.; Merco Nordstrom Valve Co., Parks Laboratories, Inc., E. W. Saybolt & Co., Anco Gas Corp., Lone Star Gasoline Co., Westcott & Greiss and the University of Tulsa.

The N.G.A.A. is attempting to determine which method of testing and sampling gives most accurate results in comparison with full-scale separation. Data on the first project may be presented at the annual N.G.A.A. meeting in Tulsa next month.

Plans are, however, to continue the testing project throughout the summer covering a wide variety of producing conditions. The well tested near Kingsville, Tex., yields approximately 0.8 gal. per 1,000 cu. ft. Possibly the next testing project will be in an area producing gas of a much higher liquid content. Before the program is completed, providing unpredictable contingencies do not interfere, wells of representative depths, pressures, saturation and other physical characteristics will be tested in order to give a full range of results.

Kenyon L. Reynolds Made Gas Director in District 5

LOS ANGELES, Calif.—Kenyon L. Reynolds, former vice president and general manager of the old Pacific Gasoline Co., has been appointed head of the natural-gas and natural-gasoline section of District 5, Office of Petroleum Coordinator, and will maintain offices in Los Angeles. Reed W. Garman is assistant chief of the section.

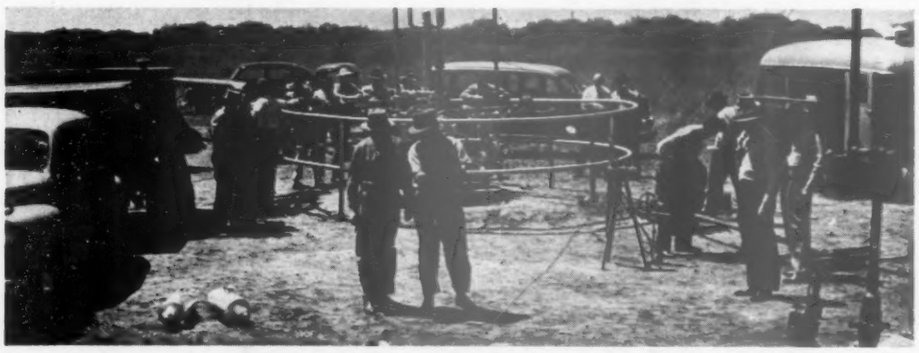
Mr. Reynolds' duty will be to coordinate production of natural gas and natural gasoline with the production of crude petroleum, so that a maximum of essential products will be available for war industries. Mr. Reynolds has been associated with the natural-gasoline operations on the Pacific Coast since 1915. During his career, he has designed, constructed, and operated compressor plants, pipe lines, gathering system, gas traps, refrigeration plants, oil absorption plants, and charcoal absorption plants.

He received his bachelor of science degree in civil engineering from the University of California and later served the Wallace Refineries, of California, as chief chemist, superintendent, assistant general manager, and vice president and general manager.

In 1922, Mr. Reynolds went to the Pacific Gasoline Co., of California, as assistant general manager. Later he became vice president and general manager in charge of 28 natural-gasoline plants operated by the company. He left the organization in 1926 and since has been independently active in the industry.

Rate Advance Suspended

WASHINGTON, D. C.—The Federal Power Commission has suspended a proposed amendment to the Cabot Gas Corp. rate schedule FPC No. 1 which would increase certain charges for natural gas sold by Cabot to Pavilion Natural Gas Co. for resale to ultimate consumers in northern New York. A public hearing on the suspended rate has been set for May 11, 1942, in the commission's hearing room in the Hurley-Wright Building in Washington.



Part of the equipment and a few of the engineers assembled at the high-pressure well near Kingsville, Tex., where sampling and testing experiments were conducted last week

This group photoed on the first day of the testing projec was later augmented by numerous gas engineers. In the picture, kneeling, are: William F. Lowe, secretary of the Natural Gasoline Association of America; George H. Edgerton, Texas Railroad Commission engineer; R. H Cosby, Shell Oil Co., Inc.; N. H. James, Stanolind Oil & Gas Co.; W. S. Cole, Lockhart Oil Co. of Texas; V. A. Goss, Agua Dulce Co.; S. M. McAnelly, Lone Star Gasoline Co.; H. L. Oder, Cities Service Oil Co., and J. C. Birdsall, Lockhart Oil Co. of Texas. Standing are: E. R. Brownscombe, Atlantic Refining Co.; T. B. Winningham, and J. M. Dillon, Shell; W. H. Flood, Jr., Alice Operators Association; L. E. Reynolds, W. R. Davis, Inc.; J. W. Northcutt, Merco Nordstrom Valve Co.; M. M. Conn, Atlantic; F. P. Peterson, Jr., Southern Minerals Corp.; H. U. Jarrett, Anco Gas Corp.; R. O. Rowe and F. A. Sandberg, E. W. Saybolt & Co.; Max L. Riley, Anco, and E. M. Slocomb, Huff Engineering Co.

Natural Gasoline

Natural-Gasoline, Condensate Output Is Increasing

Production of natural gasoline, recycle condensate and liquefied petroleum gases averaged 242,000 bbl. daily in February, the Bureau of Mines reported last week. The February output was 1,000 bbl. per day higher than reported in January. Production of these products averaged 160,000 bbl. daily in the first 2 months of 1941, approximately 82,000 bbl. per day below the yield in the same time this year.

The daily average production of isobutane increased and was 327,000 gal. in February compared with 325,000 gal. in January.

PRODUCTION AND DISTRIBUTION OF LIGHT PRODUCTS IN THE UNITED STATES

(Thousands of gallons)

Stocks first of month	207,060	180,516	230,580
Production:			
Natural gasoline	168,840	179,928	
Recycle products	54,684	61,362	191,730
Liquefied petroleum gas:			
Isobutane at nat. gaso. and recycle plants	9,156	10,080	(*)
Liquefied pet. gas at nat. gaso. and recycle plants	51,576	63,126	(*)
Liq. refinery gas at refineries	10,248	9,954	(*)
Total supply	501,564	504,966	422,310
Stocks end of month:			
Natural gasoline	193,368	178,794	
Recycle products	13,062	9,408	223,062
Liq. petroleum gas	12,348	13,482	(*)
Liq. refinery gas	6,300	5,376	(*)
Total stocks	225,078	207,060	223,062
Demand:			
Used at refineries	187,152	224,742	139,104
Nat. gaso. and recycle condensate to jobbers and retail outlets	32,382	14,910	
Liq. pet. gas to jobbers and retail outlets	33,558	35,364	60,144
Exports and losses	23,394	22,890	
Total demand	276,486	297,906	199,248

*Not available.

Oil Man Given High Post In WPB Materials Division

WASHINGTON, D. C.—Highest position yet attained by an oil man in the Materials Division of the War Production Board was assigned last week to H. W. Dodge, vice president and sales

H. W. DODGE

manager of the Texas Co. until he came to Washington December 29, 1941.

Mr. Dodge was made assistant deputy director of the Materials Division by William L. Batt, director of the division. With his new appointment Mr. Dodge becomes third in command of the Materials Division and will take over a part of the duties of A. I. Henderson, deputy director.

Before entering government service at the end of last year, Mr. Dodge had served the Texas Co. continuously for more than 30 years. He is a native of Cameron, Tex., where he was born in 1891. During summer vacations from high school, Mr. Dodge worked as a messenger for the Texas Co. at its Beaumont, Tex., offices. Permanent affiliation with the Texas Co. started after he had graduated from the law school of the University of Texas and gained admission to the bar of that state.

Order Prohibits Benzene Use in Civilian Gasoline

WASHINGTON, D. C. — The War Production Board Monday stopped the use of benzene in civilian motor fuel because it is a necessary ingredient of synthetic rubber.

Order N-137, issued by J. S. Knowlson, director of industry operations, halts the use of benzene in motor fuel immediately, with the exception that any producer or distributor may use within the next 30 days one-sixth of the amount he used for the 3 months ended March 31.

Benzene is a motor-fuel knock depressant and is a principal source of styrene, one of the main ingredients of Buna-S rubber. While production is on the increase, both demands cannot be met.

The order specifically exempts benzene used in the production of aviation fuel with an octane rating higher than 87.

Coordinator Ickes to Speak At A.G.A. Annual Meeting

NEW ORLEANS, La.—Petroleum Coordinator Ickes will be one of the principal speakers at the thirty-seventh annual convention of executives and department heads of the natural-gas utility industry to be held here May 5-7.

The convention is sponsored by the Natural Gas Section of the American Gas Association. J. French Robinson, of Cleveland, Ohio, president of the East Ohio Gas Co. and chairman of the Natural Gas Section, will preside.

Other speakers and their topics include: Edward L. Love, of New York, vice president of the Chase National Bank, "Natural Gas Financing Today for a Solvent Tomorrow"; H. V. Coes, of New York, vice president of Ford, Bacon & Davis, "Marketing Problems Under War Conditions"; Rex F. Harlow, associate professor of public relations at Leland Stanford University, "Public Relations, Yesterday, Today and Tomorrow," and George S. Hawley, of Bridgeport, Conn., president of the A.G.A., "The Gas Industry's All-Out War Effort."

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DEATHS

ANDREW J. KIRKWOOD, 77, retired oil producer, died at Oil City, Pa., last week after a lengthy illness. He had engaged in the oil business in the vicinity of Oil City for many years, and later became superintendent for Standard Oil Co., at Tampico, Mexico. His widow and two daughters survive.

VERNON E. HOWZE, 52, of Tyler, Tex., was drowned in a lake near Campti, La., last week. He was fishing when rough water capsized the craft.

CHARLES W. G. MURDOCK, formerly production superintendent for Shell Oil Co., Inc., at Bicknell, Calif., died last month. One of the early California oil men, Mr. Murdock retired to his ranch in 1933 after 32 years of service at Bicknell.

URI HUBBARD, 97, St. James, Mo., father of G. E. Hubbard and grandfather of Ray E. Hubbard, Dallas, Tex., died at his home in St. James, April 15. Other survivors are his wife, a son and a daughter.

GEORGE WALLACE GREENLEE, 45, scout for Mid-Continent Petroleum Corp., Tulsa, suffered a heart attack April 16 and died before a physician could be summoned. Death occurred at Tyler, Tex. His widow survives.

JOHN S. LANIER, 69, a retired oil operator, died at a Shreveport, La., sanitarium late last week. He was employed by Standard Oil for 20 years prior to becoming a private operator. His widow, a son and a daughter survive.

AL T. WITHROW, 64, veteran oil operator, and vice president of Loual Drilling Co., died April 12 at Ada, Okla. His operations included Texas in the days of Mexia and Burkburnett, Louisiana and Arkansas. His widow and a daughter survive.

GEORGE LEES, 72, retired oil-field contractor, died at his home in Electra, Tex., April 14. He operated well-servicing equipment. Two sons and three daughters survive.

DR. HAROLD EVANS ELLIOTT, 69, died in a Los Angeles, Calif., hospital, April 11, following 2 years of failing health. Dr. Elliott had charge of the first oil refinery built in the West, at Florence, Colo. He opened up oil fields in New Mexico and West Texas. His widow, a son and a daughter survive.

CONDENSED DIRECTORY OF THE OFFICE OF PETROLEUM COORDINATOR

Interior Department (New Building) 18th and C Sts., N.W. Phone Republic 1820

Coordinator.—Harold L. Ickes, room 6156, extension 500.

Deputy Coordinator.—Ralph K. Davies, room 6654, extension 3831-2.

Assistant Deputy Coordinator.—Robert E. Allen, room 6645, extension 3334.

Production Division.—D. R. Knowlton, director, room 6070, extension 4861.

Refining Division.—Wright W. Gary, director, room 6637, extension 3233.

Transportation Division.—J. R. Parten, director, room 6629, extension 3557.

Research and Planning Division.—Edward B. Swanson, director, room 7315, extension 649.

Conservation Division.—Everett L. De Golyer, director, room 7516, extension 4459.

Materials Division.—William F. Huff, director, room 7314, extension 4585.

Petroleum Supply Division.—Robert L. Minckler, director, room 4448, extension 4834.

Legal Division.—J. Howard Marshall, chief counsel, room 6649, extension 4100.

Marketing Division.—John W. Frey, director, room 6623, extension 4646.

War Production Board Consultant on Priorities.—O. A. Davis, acting chief, room 7340, extension 4616.

Executive Officer.—Stanley W. Crosthwait, room 6415, extension 4363.

Information Division.—Herbert A. Yocom, director, room 7513, extension 3844.

Foreign Division.—James T. Duce, director, room 7446, extension 4788.

Liaison.—Brig. Gen. Walter B. Pyron, liaison agent between War Department and OPC. Phone Republic 6700, extension 6044, room 6261, new War Dept. Bldg.

Tanker Coordinating Board.—Ralph K. Davies, chairman, room 6654, extension 3831-2.

Receptionist.—Mrs. Rosalie E. Reid, room 6635, extension 3429.

DISTRICT OPC OFFICES

DISTRICT 1
122 East Forty-second St., Chanin Bldg., New York City

DISTRICT 2
120 South La Salle St. Bldg., Chicago, Ill.

DISTRICT 3
245 Mellie Esperson Bldg., Houston, Tex.

DISTRICT 4
817 Seventeenth St., United States Natl. Bank Bldg., Denver, Colo.

DISTRICT 5
417 S. Hill St., 855 Subway Terminal Bldg., Los Angeles, Calif.

WAR PRODUCTION BOARD

Social Security Building, Fourth and Independence Ave., S.W. Phone Republic 7500

Division of Civilian Supply (Temporary Building D).—Leon Henderson, director, room 46, extension 5586.

Petroleum Unit (Temporary Building R).—W. G. Shallcross, business specialist, room 1709, extension 3722.

Bureau of Industry Branches.—Philip D. Reed, director, room 5420, extension 3394.

Petroleum Machinery and Equipment Section (Temporary Building, East, Seventh Wing, Third Floor).—A. E. Collins, chief, extension 5741.

Liaison With Office of the Petroleum Coordinator and Reconstruction Finance Corp. — R. O. McClintock, room 5193-A, extension 71181.

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Geologists Survey Needs for Increased Discovery Rate

By W. V. HOWARD

A SURVEY of oil-discovery methods was summarized by the research committee of the American Association of Petroleum Geologists on Tuesday evening. A. I. Levorsen, consulting geologist of Tulsa and chairman of the committee, presided at the meeting.

At the beginning of the year, Mr. Levorsen addressed a letter to a number of leading geologists asking for an expression of opinion on the following question:

"Granted the premise of a satisfactory price; thinking of the problem from a broad point of view; and considering all of the modern techniques of geology, physics, chemistry, and engineering, which of the current methods or combination of methods, applied to oil exploration, do you regard as offering the most promise in maintaining an adequate oil and gas-discovery rate in the foreseeable future? Which of the lesser ideas, techniques, or methods do you believe are of most significance and of increasing usefulness as guides to oil prospecting? In other words, what in your judgment is the best approach to the problem of oil and gas discovery?"

Replies were received from most of the geologists addressed and these answers were grouped under nine principal headings covering major subdivisions of the field of exploration.

Philosophical Considerations

A large number of geologists considered that one of the most essential factors in increasing the discovery rate is a survey of the facts regarding the status of the nation's reserves. Although opinions varied from the pessimistic view that a shortage is impending in the immediate future to the optimistic view that adequate reserves will continue to be found for some time, there was general agreement as to the increasing difficulty of finding new reserves. There was also practical unanimity regarding the lack of any single method of prospecting which could be employed to the exclusion or even subordination of others. As one geologist pointed out, the best method to use in any particular case is the one that finds the field and this may even include random drilling. What is needed is optimism on the part of the geologist and freedom from restraint in planning drilling operations whether this restraint is imposed by others or by his own pet theories. The present dominant position of the United States is not due to any superiority of its geologists or to a monopoly on any prospecting method but to the fact that Americans have already shown a greater degree of optimism and speculative ability in the search for oil than have geologists in other countries.

The suggestion was made that there are definite reasons for the existence of petroliferous provinces and that prospecting in the vicinity of known occurrences of oil is likely to lead to much more successful results than wandering far afield.

Geology

It is perhaps understandable that geologists should advocate more attention to their science in the search for oil but those who did so pointed out that what is needed is not some new development but a reexamination of the fundamentals now in general use. Surface geology, the earliest geological method used, has far from outlived its usefulness in the opinion of geologists. In fact, it was pointed out that there are many areas in the oil districts in the United States where there is lacking not only geological maps but even base maps on which the geology can be plotted. Although not minimizing the importance of geophysics it was stated that many structures found by geophysical methods could have been discovered by geology had a fraction of the amount spent been devoted to geological work. The tendency to rate poor geophysical better than good gological prospects was decried.

Above all, the need for maps was emphasized, not only surface and structure maps but also isopachous maps which can throw much light on stratigraphic traps. One man stated that early structural conditions were much more important in the accumulation of oil than late ones. These are portrayed much more successfully by isopachous maps than in any other way.

Stratigraphy and Sedimentation

Two years ago a poll of the A.A.P.G. membership placed sedimentation in the front rank of subjects needing additional research. Realization of the importance of stratigraphic traps in the localization of oil appears to have intensified this belief. Man after man stressed the fact that we have barely begun to know the facts about the deposition of sediments and the distribution of different facies within the earth. Yet, as many state, this is essential if seismic records are to be accurately interpreted. In this connection, the electric log and the drilling of stratigraphic tests are commended as new tools whose usefulness is only beginning to be made apparent.

Several geologists referred to the fact that possible overemphasis on structure has resulted in passing up many opportunities of locating oil and others stated that more emphasis on the "geo" and less on the "physics" would increase the usefulness of geophysics.

Research

Among the replies received, surprisingly few stressed the need for more geological research outside of the fields of stratigraphy and sedimentation. With these exceptions, the most popular topics for research were the origin and migration of oil, the two most fundamental phases of petroleum geology. A few years ago, the need for more research was apparently greater than it is now. The replies indicated that this apparent lessening interest in research is not due to any lack of desire for more knowledge but rather to the need of increased understanding of what is already known. The present trend appears to be the elimination of "facts that aren't so" from the thinking of the man in the field and more careful scrutiny of evidence provided by the drill and the various prospecting and log-

(Continued on Page 45)

Committee chairmen, twenty-seventh annual meeting, American Association of Petroleum Geologists. Seated: C. E. Erdmann, vice president, Rocky Mountain Association of Petroleum Geologists; H. E. Christenssen, president, Rocky Mountain Association of Petroleum Geologists; C. E. Dobbin, general chairman; F. M. Van Tuyl, eastern slope trips; A. E. Brainerd, technical program. Standing: W. A. Waldschmidt, publicity; C. A. Heiland, Society of Exploration Geophysicists; C. M. Rath, registration; W. O. Thompson, educational exhibits; C. S. Lavington, hotels; H. W. Oborne, entertainment; J. H. Johnson, Society Econ. Paleontologists and Mineralogists

Geology May Afford Link in Good Neighbor Policy

"Something there is that doesn't love a wall,
That sends the frozen ground swell under it
And spills the upper boulders in the sun."
—Robert Frost.

By WALLACE E. PRATT*
Vice President, Standard Oil Co. (New Jersey)

THE old New England adage "good fences make good neighbors" is valid only where fences are necessary to prevent the encroachment, intentional or unintentional, of one neighbor on another. Fences that become barriers to free intercourse between friends, stifle neighborliness, whether the friends be individuals or nations. Customs charges, travel restrictions and tariff walls tend to "fence out" and to "fence in" neighborly instincts between nations. Earth forces take no account of these man-made barriers. The deposition of sediments on the floors of former seas, the deformation of the earth's crust, the transit of mineral-laden solutions through the pores and voids of deeply buried rocks; these changes have proceeded throughout earth history in total disregard of the national boundaries that later were to divide the land surface into sovereign states. Geologists, also, absorbed in the study of these fascinating processes, tend to ignore the political dividing lines that stretch across the terrain they explore.

With this background geologists should be predisposed in favor of the rejuvenated effort of the Government of the United States to establish among the nations of the Western Hemisphere a Good Neighbor Policy (the objective of the Good Neighbor Policy was originally proposed 60 years ago by James G. Blaine, then secretary of state, and formally organized by him as the Pan American Union in 1889).

Western Hemisphere Commonwealth

The kind of order that is to come about in the Western Hemisphere as a result of the Good Neighbor Policy was described recently by the assistant secretary of state, A. A. Berle, Jr., as "the idea of commonwealth, of peace without empire[1]." In this "cooperative peace" there will be "greater United States leadership in certain fields, and especially the field of semisocialized finance, which is proving the key to so many economic problems." This is in contrast to the "old practice." "In the nineteenth century," Mr. Berle says, "the grand idea was that capital must seek outlet, and naturally would seek the most profitable employment. There was no thought of balancing capital outlet against national interest; and Latin America became spotted with enterprises in foreign hands. . . . These were not government enterprises—they were private. In many cases they raised substantial and difficult questions; often the problems were extreme."

Mr. Berle apparently visualizes a Western Hemisphere in which a commonwealth without empire will arise through international cooperation. The United States will assume leadership in the development of natural resources and the increase of production throughout the hemisphere, looking toward collective self-sufficiency to be administered strictly in the interest of the individual nations. To this end Americans will contribute financial resources, on a "semisocialized" basis, along with technical and organizing skills.

The concrete form of the Good Neighbor Policy begins to be discernible in the resolutions adopted at the third meeting of the Ministers of Foreign Affairs of the American Republics at Rio de Janeiro, January 15 to 28, 1942.

Bearing on mineral resources, Clause 8, captioned Inter-American Development Commission, resolves: "To instruct the Inter-American Financial and Economic Advisory Committee to create, under the auspices of the Inter-American Development Commission (in Washington), a permanent body of technical experts to study the natural resources of each country when so requested by its government."

Clause 16, "Economic Collaboration," declares:

1. That since the best interests of the continent require the proper utilization of the natural resources of each country, including those of the subsoil, the American Republics should endeavor within their own economic systems, to develop such resources.

2. That in keeping with the spirit of solidarity and collaboration inspired by the doctrine of Pan Americanism, plans for cooperation should be made through the Inter-American Development Commission and its National Commissions in order to facilitate the financing of such development projects, with due regard to the economic possibilities of each country.

Among projects that have already been selected for development in line with these plans, according to press reports, are the oil resources of the Republic of Bolivia and the Itabara iron-mining properties in Brazil.

WALLACE E. PRATT

Indispensable to the success of the Good Neighbor Policy is a balanced economic structure embracing the several nations of the Western Hemisphere, and indispensable to economic balance is the production of appropriate exportable surpluses in each nation. Among possible exportable surpluses from Latin America that would be most readily marketable in the United States are a number of mineral resources. None of these mineral resources are fully developed and few of them are adequately explored.

It has been pointed out[2] that the 20 American republics south of the Rio Grande with a population of some 130 million people produced about 5 billion dollars worth of goods annually in the years just preceding the outbreak of the present war. North of the Rio Grande, by contrast, a single republic with a population of 130 million people produced 70 billion dollars worth of goods in the last year before the war. One cause of this great disparity in the productive capacity is the smaller output of minerals and mineral products in Latin America, notwithstanding the fact[3] that from the Latin-American republics the United States itself receives 35 per cent of its copper; 20 per cent of its tungsten; 25 per cent of its zinc; 20 per cent of its lead, and 33 per cent of its antimony.

Latin America's mineral resources, rich as they are potentially and essential as some of them are to the war economy of the United States, are largely undeveloped. While for many years we have imported rich ores of both iron and aluminum from South America, other extensive deposits of these ores remain unexploited, hardly explored. Greater quantities of manganese, vanadium and nickel, which we need, would be available from Latin America if known occurrences were more fully developed.

Bolivian Ores Valuable

Conspicuous among the metallic mineral resources of Latin America which the United States plans to draw upon more fully and more directly in the future, are the tin ores of Bolivia. The United States normally consumes about 75,000 long tons of tin annually. Bolivia produces 38,000 long tons of tin annually, about 16 per cent of the world production. In the past the Bolivian tin ore has been smelted in Europe and has gone to market through the International Tin Control Scheme, the world-wide tin cartel. In 1940, in line with the Good Neighbor Policy, the United States, acting through the Metals Reserve Corp., contracted to buy from Bolivian producers low-grade tin ores in an amount of 18,000 long tons (metallic tin content) annually. The remainder[4] of the Bolivian production, some 50 per cent of the total, including most of the higher-grade ore, will continue under long-term contract to go to British smelters for the account of the international cartel.

Under the operation of the Good Neighbor Policy as it now takes form the responsibility for the development of the mineral resources of South America will devolve largely upon American geologists. Indeed, the obligation has already been assumed. A number of American geologists have

*Author's title: "Good Geologists Make Good Neighbors."

already taken up their new posts and a larger number will inevitably follow, to engage themselves with the problem of mineral production by our neighbor republics over the coming years.

An inevitable byproduct of the exploration of mineral resources in Latin America, one which, as many other byproducts have done, may come to surpass in importance the principal objective, will be an expanded knowledge of the fundamental geology of South America. That American geologists have published so little on the geology of Mexico, Central and South America in comparison with the wider and more profound studies of European geologists, ill becomes us as good neighbors. We lack even an adequate base map of South American areal geology. Correlation charts relating the stratigraphic sequence in North America to that of South America exist only in the most generalized form. The universities and the governments in South America look to Europe for geologists and for geological counsel. South American geologists publish in European scientific journals and they rely upon European geologic literature for their text books, their current information and their reference works. At best the geologic literature on Latin America in any tongue is scant. American geologists, as good neighbors, have a wonderful opportunity to make available for the first time to themselves and Latin Americans, alike, the results of comprehensive studies of South American geology.

Training of Latin-American Geologists

A kindred duty that will devolve upon American geologists under the Good Neighbor Policy is the training of young geologists among the nationals of the different Latin-American republics. As rapidly and as fully as possible the actual operation of the enterprises financed and initiated by Americans in each of these nations will of necessity pass into the hands of the citizens of that nation. A common requirement in Latin America today is that 90 per cent of the workers in any operation be nationals and that collectively these nationals receive 90 per cent of the total pay roll. American private enterprise operating mineral industries in Latin America has adapted itself to this requirement and has succeeded in building up competent personnel almost exclusively composed of nationals in each country. Nevertheless the training of adequate native staffs for the technical supervision of the new mineral industries will be a formidable task, demanding infinite tact and patience. It involves not only enlarged facilities for academic instruction in the science of geology in a score of national centers, but the even more difficult training in the practical application of the science in the field. Field work in geology is arduous and exacting. When it is devoted to the exploration or development of mineral resources, it requires collaboration and team work between geologist and common laborer on an equal footing. The social background of educated Latin-American causes them to hesitate at a career of this character. The training of competent exploration and production geologists among the nationals of the various Latin-American republics will prove to be one of the most difficult, as it is one of the most important, obligations of American geologists as Good Neighbors.

Oil and oil geologists are cast for important roles in this drama of international comity in the Western Hemisphere. American geologists realize only too well that mankind's oil resources are concentrated within relatively narrow segments of the earth's crust. Two principal regions stand out preeminently as sources of much the largest part of all the oil discovered on earth up to the present. Widely separated, situated roughly at the opposite ends of an earth diameter, these two regions are central to the Eastern and Western hemispheres, respectively, in the Near East, at the far end of the Mediterranean area of the Old World, we find one of the "poles" of this oil "axis." The other lies around the margins of the Gulf of Mexico and Caribbean Sea, the mediterranean area of the New World. Here the Western Hemisphere has its future oil supply. Elsewhere on earth there are important oil resources, to be sure, but compared to these two principal areas they are of subordinate proportions. The real stores of oil in the earth are found at the two ends of this axis.

Dependence on Oil

However vivid this world picture of oil may be to geologists, people generally in this country have not seen it clearly as yet. We are only beginning to grasp the significance of this distribution of mankind's oil resources. The war has focused our vision more sharply and we become aware for the first time of the stark reality which confronts us. The Western Hemisphere cannot safely depend for oil supplies on fields that are half a world away; nor can it continue to rely indefinitely, as it has in the past, on the older fields in the central part of the United States. It must quickly develop large additional supplies of its own. The most promising possible source for these imperative new supplies is the little explored region of tropical Latin America on the wide southern fringe of the Gulf of Mexico-Caribbean Sea area.

In this principal oil province of the Western Hemisphere, the northern margin of the Gulf of Mexico lying within the United States is, of course, already comparatively well explored. Much of our proved oil reserve is contained in this part of the nation, yet it continues to offer us our best prospect for important future discoveries. In Mexico, in Central America and in the West Indies much geologically promising territory remains to be developed. But it is in northern South America, along the flanks, on both sides, of the several prongs of the Andes Mountains, that the most extensive and most promising hunting ground for new oil fields awaits the geologist and the wildcatter.

Americans, geologists and engineers, have found and developed most of the world's oil in the past. Distinctive social habits, skills and talents fit Americans better than any other people on earth for this very special art, the task of oil-field discovery. On Americans will fall, then, the responsibility for the prompt discovery, the intelligent development, and the proper conservation of the oil resources in tropical America, from which the Western Hemisphere, as a group of Good Neighbors, will draw much of its future supply of oil.

Aid to Latin America

It is not surprising in a world at war, perhaps, that our first official steps toward hemispheric solidarity take the form of direct government loans of money, materials and technical experts to Latin America, for the development by the several governments of their own natural resources on a nationalistic basis; nor that private financial and industrial agencies appear for the moment to be excluded from the scene or relegated to a subordinate position. Obviously our Government is conscious of the responsibility resting upon it to make the Good Neighbor Policy really good for our neighbors, and to make sure that the Latin American peoples retain for themselves a fair share of the benefits and wealth to be created by the new production program. For this reason our Government proposes itself to sponsor the early development.

During this initial phase of the Good Neighbor enterprise, then, geologists will be working for government, not for industry. The wheel will have come a full turn and whereas, a generation ago, many of us left government service to go into industry, others now will start a new cycle as a part of the machinery of the state. Geologists will not be unduly unconcerned at this aspect of their new fields of endeavor; normally most geologists probably work for production rather than for profit, anyway; and they will strive just as hard under the direction of government commissions as they have on the frontiers of industry.

But the prospect is that the cycle will again

(Continued on Page 88)

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Geologists Survey Needs for Increased Discovery Rate

(Continued from Page 43)

ging techniques. When these are fully utilized, problems requiring research will again become pressing.

Coordination

The consensus of geological thought appears to be best expressed by the many company chief geologists and others holding comparable positions who stated with striking unanimity that no new method was in sight, that there was no method which could be called "minor" universally, that the present efforts of geologists were too casual and that what was needed was coordination of all prospecting methods and detailed study of all available information. Reference was made to the storehouse of facts which every geological department has filed away and forgotten, reexamination of which would lead to increased discoveries. During the past few years, many geologists have stated that certain branches are becoming of less importance. If the replies to Mr. Levorsen's question are any criterion, these decisions are now being reversed and it is now felt that the importance of every branch would increase if that subject was used thoughtfully rather than superficially. There is no longer an easy way to find oil.

Unitization and Coordination

Conforming to the present trend toward cooperation and pooling of effort, many geologists deplore the repetitious casual study of a single problem by a number of men and organizations, each of which can devote only a limited amount of time and money to it. If these efforts were coordinated and all information pooled, much more could be accomplished. This idea is in line with the availability of electric logs, whose usefulness has been increased by reason of the fact that they are made available to all. The pooling of seismograph records is also increasing. Some geologists now recommend the pooling of all information, even on a nation-wide basis. Some, considering the present emergency, recommend that this be done under governmental control. To the present writer, this would appear to defeat its own purpose. If, as many point out, companies have stored in their archives more facts than they can now use, increasing the store of facts would only increase the difficulty of using them.

More practical suggestions made by some geologists involve the pooling of effort by all interested in specific problems of specific areas. This was extended into rank wildcat areas where the competitive spirit has been strongest. The cooperative drilling of stratigraphic tests finds much support among geologists and the state-

ments made indicate that only company policy and executive veto prevents much closer co-operation at the present time.

Geophysics

The old argument as to the relative merits of geology and geophysics continues with some extolling the merits of the seismograph and others pointing out that in some areas as good results could be obtained by stabbing a pencil at a map of the region. Support of the reflection seismograph as the most valuable geophysical instrument is, however, general, with the proviso that its use must be accompanied by more geological supervision. Many geologists feel that seismograph work should follow careful geological prospecting.

So far as future development is concerned, great hope is held out for the added importance of the seismograph as greater accuracy and skill in interpretation are attained. Other geophysical methods appear to have less general applicability and little hope was expressed as to the probability of the development of any new method.

Geochemistry

The references made to geochemistry indicates that it still has not met with widespread acceptance among geologists. Opinions expressed concerning its future value ranged from enthusiastic endorsement to rejection. That the endorsements come chiefly from representatives of service companies does not necessarily indicate that self-interest is responsible for their views. Their experience with this new development is naturally broader than that of others. They have seen it work in some areas, while many geologists have had much more limited data on which to base their opinions. The replies presented at the meeting confirmed the views expressed at Chicago 2 years ago, namely that geochemistry was still not proven.

Drilling

Increased exploratory drilling is the prime requirement, according to a number of geologists, one of which attributes 29 per cent of all oil discovered directly to the wildcatter and considers that as much as 45 per cent more may be due to evidence furnished by dry holes. The emphasis, however, was not placed on random drilling but upon carefully selected tests drilled solely for the purpose of providing information. Many geologists feel that there should be a more positive attitude toward the drilling of wells; in other words, favorable prospects should be drilled, even on meager evidence. Such wells may repay their cost in the information they furnish, even though this cannot be shown on a balance sheet Agreement that the stratigraphic type field will provide more oil than the structural trap is general, as well as the fact that drilling of exploratory wells provides the best opportunities for finding fields of this class.

The Geologist Himself

Probably summing up all of the diversified suggestions offered by the nation's leading petroleum geologists are the answers dealing with geologists themselves. There is much dissatisfaction with dominance of geologists by executives who cannot appreciate the value of the exercise of the imagination so essential in modern geology.

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Geologists Discuss Problems Of War and Oil Exploration

DENVER, Colo.—The American Association of Petroleum Geologists' twenty-seventh annual meeting, which is being held at the Cosmopolitan Hotel here, began Wednesday morning with a joint session with the Society of Economic Geophysicists and the Society of Economic Paleontologists and Mineralogists. Following an address of welcome by Hon. Ralph L. Carr, governor of Colorado, and a reply by H. E. Christenssen, president of the Rocky Mountain Association of Petroleum Geologists, the retiring presidents of the three societies delivered their presidential addresses. Ed W. Owen, president of the A.A.P.G., and Henry B. Peacock, president of the S.E.G., discussed the role of their respective sciences in contributing to solution of the problems resulting from the present war. Henry V. Howe, president of the S.E.P.M., showed how neglected branches of the science of micropaleontology would have to be brought into use in the search for new oil deposits, particularly in the southeastern states.

Following the presidential addresses, Wallace Pratt, director and vice president, Standard Oil Co. of New Jersey, spoke on the topic, "Good Geologists Make Good Neighbors." Mr. Pratt's paper is presented beginning on Page 44 of this issue. E. L. DeGoyler, director, Conservation Division, OPC, spoke on the present status of the problem of exploration and Carey Croneis, University of Chicago closed the first general meeting with a discussion of "Geology in War and Peace."

In the afternoon, the three societies presented a symposium of the "Application of Geology and Geophysics to War and Post-War Problems of the Petroleum Industry" and on Wednesday evening a group composed of chief geologists and others met to discuss the emergency problems of personnel. The subject considered included the proper scope of requests for selective-service deferment, the temporary employment of technical men to fill the vacancies left by men going into military service and readjustment of personnel to meet emergency requirements. The conference was held under the chairmanship of William B. Heroy, president, Pilgrim Exploration Co., Houston, Tex.

The technical sessions of the meeting began this morning and will be continued through Friday. Many papers of general and local interest were presented at these meetings, abstracts of some of which are presented below.

Ed W. Owen, president, A.A.P.G.

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CARL A. HEILAND (Colorado School of Mines, Golden, Colo.)

Applications of Geophysics in War

War-time applications of geophysics come under the heading of military operations and location of essential minerals. In the combat zone, sound ranging helps to locate hostile guns and to adjust friendly artillery. Listening devices determine the approach of submarines or airplanes. Buried munition dumps, shells, and bombs can be located by radio-detection devices. Vessels at sea may establish their position by radio-acoustic ranging. Planning of fortifications and harbors and location of construction materials will be aided by seismic refraction. The same methods are applicable to problems involving the construction of railroads, highways, bridges, tunnels, and munitions plants. For the last, added protection is possible by static-ground-resistance investigations. Salvage operations, location of shipwrecks and practice weapons are aided by echo-sounding and ralio methods.

In the second group, geophysics is concerned with the location of water, fuels, and strategic minerals. Water may be found under favorable conditions by electrical and seismic methods, and water wells may be tested by electrical logging. Geophysical foundation investigations are applicable in irrigation, flood-control and power projects. Magnetic, gravimetric, seismic-reflection, and electrical well-logging methods occupy a prominent place in oil exploration. Coal and lignite deposits may be mapped by geophysical methods. Magnetic, electrical, gravimetric, and seismic exploration methods are now used in a systematic government-sponsored exploration program to uncover vitally needed deposits of bauxite, chromite, manganese, mercury, nickel, tin, and tungsten.

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W. T. NIGHTINGALE (Mountain Fuel Supply Co., Rock Springs, Wyo.)

Petroleum and Natural Gas in the Nonmarine Wasatch Formations of Northwest Colorado and Southwest Wyoming

The development during the past few years of commercial volumes of petroleum and natural gas in the Wasatch formation of Northwest Colorado and Southwest Wyoming has aroused considerable geological comment.

The Wasatch formation is of Eocene age and fluvio-terrestrial in origin. Geological field studies have established Wasatch sedimentation as of the continental type and definitely nonmarine.

Petroleum and natural gas have been developed in and are now being produced from the Hiawatha member of the lower Wasatch. The production is believed to be indigenous to the Wasatch formation and not migratory from other formations. The occurrence of hydrocarbons in large volumes in a nonmarine formation, and apparently indigenous thereto, is most unusual geologically.

The commercial accumulation of both petroleum and natural gas in the Wasatch formation appears to be controlled, in the main, by structural folding. However the extreme lenticularity of the Wasatch sands and the resultant stratigraphic traps formed by sand lensing are of more

(Continued on Page 53)

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Wildcat Drilling in 1941

By FREDERIC H. LAHEE
Chief Geologist, Sun Oil Co., Dallas, Tex.*

The total number of wildcats drilled in 1941, in the states covered by this report, was 3,264, and the footage drilled was 11,615,085 ft., as contrasted with 3,038 holes and 10,144,870 ft., respectively, in 1940. The average depth of hole increased from 3,339 ft. to 3,559 ft. for all states covered, and from 4,209 ft. to 4,372 ft. in the southern states.

Except for a slight rise, in 1941, in the curves expressing rate of discovery, there has been a decline since 1937. The facts are a challenge to the industry not only to expand exploration, but also to promote research which may in any manner improve or revise our present methods of looking for oil.

THIS paper reviews data on wildcat drilling for the seventh consecutive year.[1] The states from which information was available are indicated in Fig. 1.

We have continued to use the definition of a wildcat as a hole drilled completely outside the known boundaries of pools already developed, and far enough from producing areas to be essentially a test of new possibilities. Generally speaking, such a hole would be at least 2 or 3 miles from production; but, where subsurface conditions may change within short distances, as in the case of lensing sands and salt-dome structures, and where, consequently, predictions based on the known may turn out to be greatly in error, a test hole may be regarded as a wildcat even if it is only ½ or ¾ mile from production or from an abandoned dry hole. It is important to note that this does not make distance from a pool the sole factor in the definition; nor should it be. Often a hole to be drilled within less than a mile from production is just as much a wildcat, is just as much a financial risk, and should receive just as much encouragement in the search for new reserves, as a hole 2 or 3 miles from production. In every case the degree of uncertainty of the geological conditions should be taken into consideration.

In compiling the data, questions have arisen as to just how to classify footage drilled in certain wells which are strictly neither dry holes nor producers from top to bottom. For instance, within the boundaries of a pool a hole may be drilled below the lowest pay zone in search of some unknown new pay. In the sense that it is exploring for deeper untested possibilities, its footage drilled below the lowest known pay is wildcat. It might be called a semiwildcat. If it discovered oil or gas in a deeper formation this extra footage might be listed as semiwildcat discovery footage; and if, on the other hand, it failed to find a deeper pay, the depth drilled below the lowest producing formation would then be termed semiwildcat dry footage. For the most part this kind of semiwildcat footage has been omitted from our statistics. It comprises only a small percentage of the whole.

A somewhat similar case is that of a wildcat well drilled through one or more prospective pay zones to a considerably greater depth and then plugged back to completion as a producer. However, in a hole of this kind, since the total depth would be charged against the cost of the completed producer, we have listed this total depth in the column for producers.

A further question was raised this year as to whether actual footage drilled within the calendar year should be the basis of footage drilled or whether, as in past reports, the total footage of all the holes actually completed or abandoned within the calendar year should be used. We have continued the latter course, first, in order that this year's figures may be more properly comparable with the figures in the earlier reports; second, because the former method requires more detailed analysis on the part of those furnishing the statistics; and third, because we are as much concerned with individual holes, as with footage in these holes, and the former method would involve considerable repetition in the number of holes wherever the holes were started in one year and finished in a succeeding year.

On the maps (Figs. 1 and 2), numbers in parentheses indicate total footage drilled; figures preceding parentheses indicate the number of holes drilled; figures above the cross line are for producing wells, i.e., oil, oil and gas, distillate and gas, and gas; and figures below the cross line are for dry holes.

In the states covered in this review, as shown in Fig. 1, and listed in Table 1, during 1941 a total of 11,615,085 ft. was drilled in 3,264 holes, divided as follows:

503 producers	2,047,377 ft.
2,761 dry holes	9,567,708 ft.

This means that 15.41 per cent of the holes drilled, and 17.62 per cent of the footage drilled, was successful in 1941. One producer foot was

(Continued on Page 49)

Fig. 2—Map showing wildcatting in the southern states in 1941. Legend as in Fig. 1

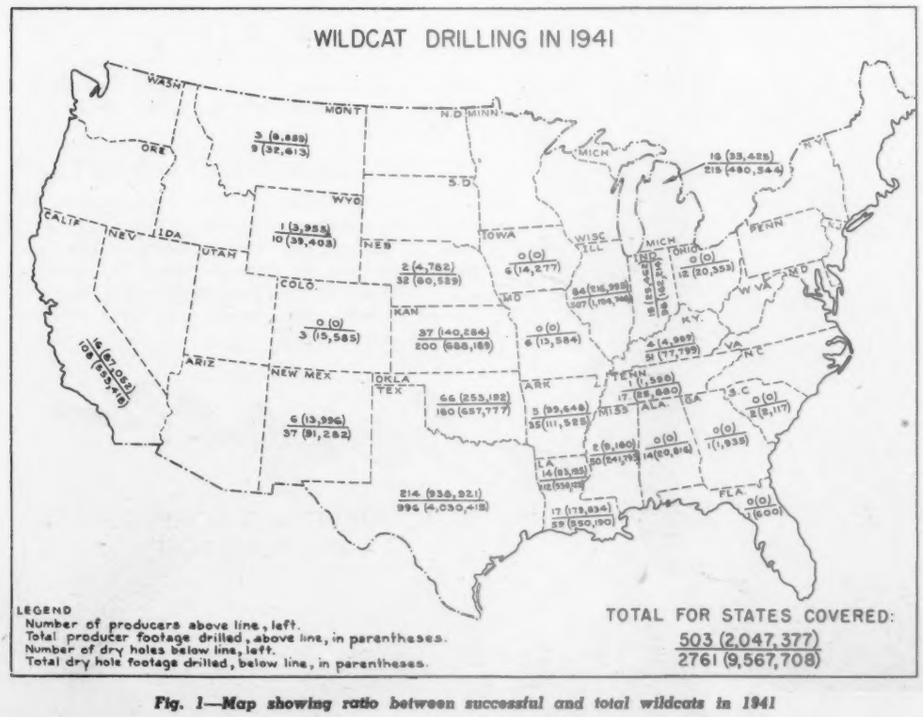
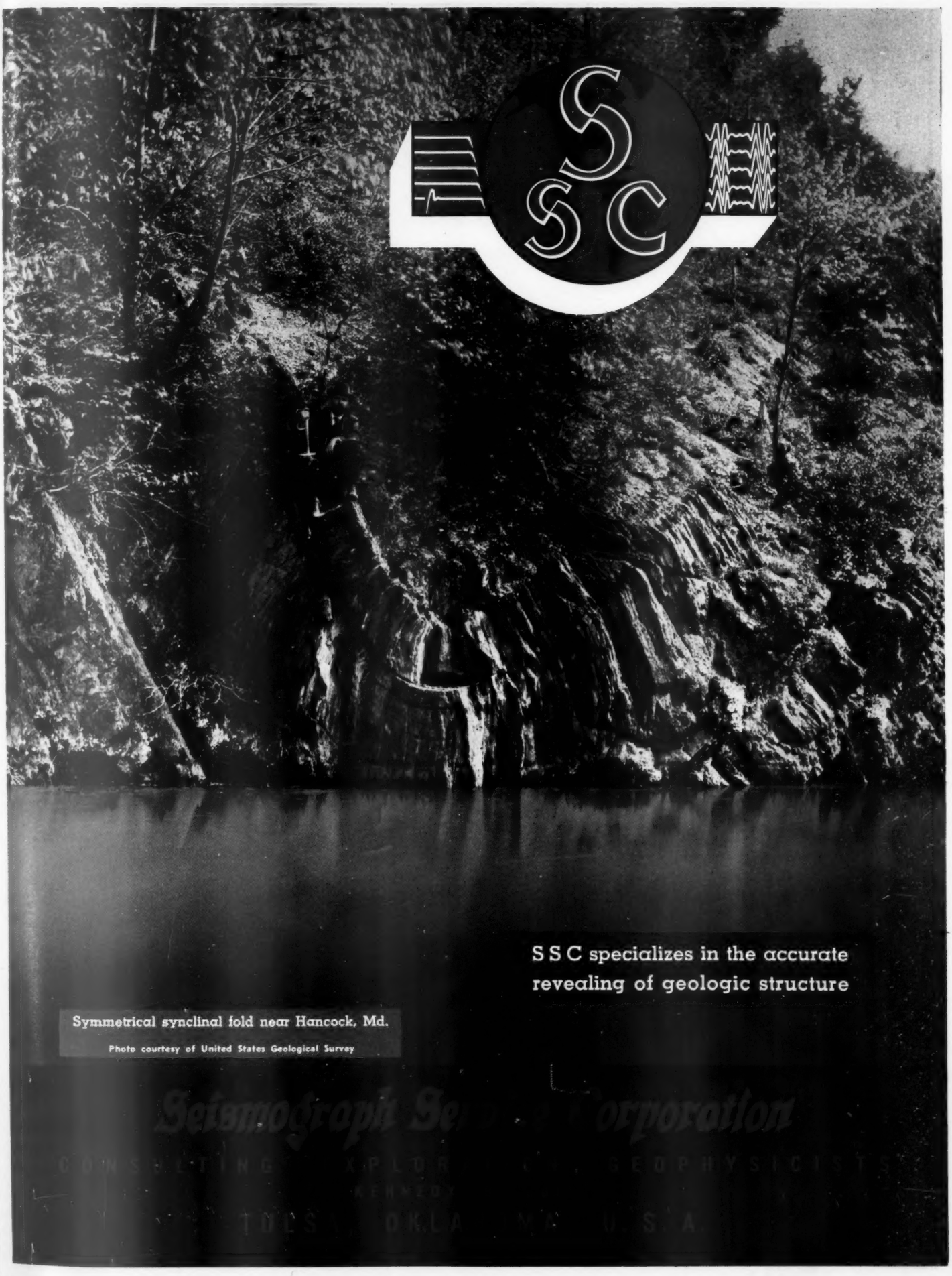


Fig. 1—Map showing ratio between successful and total wildcats in 1941

*This paper was presented at the Denver meeting of the American Association of Petroleum Geologists, with whose permission it is printed by The Oil and Gas Journal. It will be published in the bulletin of the association at a later date. The writer acknowledges with thanks the kind assistance and cooperation of the following gentlemen in compiling data for this summary: A. P. Allison, L. J. Bateman, A. H. Bell, K. E. Born, N. Burnett, D. H. Cardwell, C. H. Coldwell, R. J. Cullen, M. H. Funk, G. C. Gester, George E. Heap, E. A. Koester, C. S. Lavington, G. D. Lindberg, A. M. Lloyd, R. W. Mallory, Graham B. Moody, D. J. Munroe, G. W. Myers, Jack Parker, Howard C. Pew, C. H. Row, G. C. Sleight, L. C. Smith, and E. B. Wilson.



Symmetrical synclinal fold near Hancock, Md.

Photo courtesy of United States Geological Survey

Seismograph Se[illegible]orporation

CONSULTING [illegible] GEOPHYSICISTS

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TYPICAL OIL-FIELD STRUCTURES

Massive Limestone High

Yates Field, Pecos County, Texas

(Compiled by The Oil and Gas Journal)

GENERAL GEOLOGY: The Yates field is one of a number of major fields which obtain their production from massive limestone bodies below a thick section of evaporites, or salts, deposited in a cut-off basin by evaporation. It differs from most of the other fields in the West Texas-New Mexico Permian basin in that the structure is plainly visible at the surface. The fields lie mainly along both sides of the Central basin platform which is flanked on the east by the Midland basin and on the west by the Delaware basin. Minor features, such as the Reagan uplift and the north end of the Eastern platform also contain important oil fields. As the Central basin platform extends to the north, it swings to the west into the Artesia area of New Mexico. Farther to the north the platform fades out into a number of local structures, but there has not been sufficient development in this sector to make the relations clear.

Extending diagonally across the platform are a number of northwest-southeast trends along which the principal fields are situated. Yates lies at the southeast corner of the platform where it is cut by the Sheffield channel.

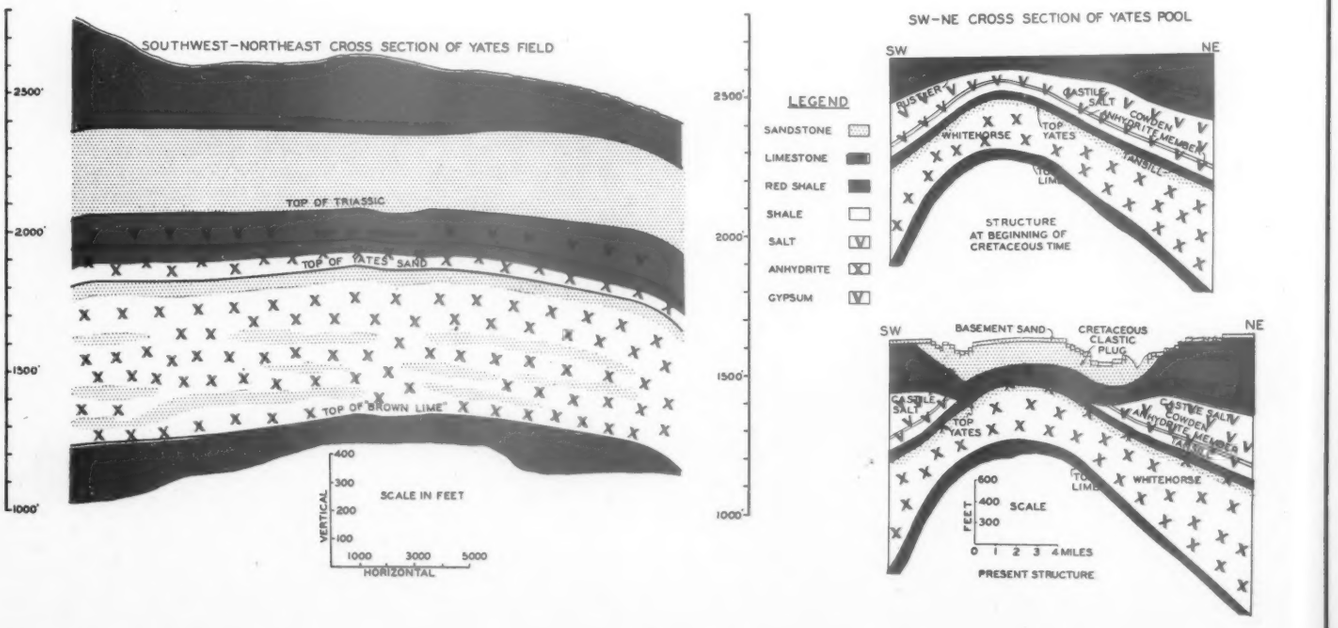
In the Permian basin there is a regional unconformity at the top of the lime, with the result that different series in the Permian are exposed in different parts of the area. The limestone immediately below the anhydrite in the southern part of the area is Whitehorse in age, while in the Panhandle and in the southern part of the basin, the Clear Fork immediately underlies the anhydrite. The transition is not entirely gradational, however, so that where the top of the Clear Fork did not form a basin in which the evaporites were deposited, it formed a lond area which was subject to erosion. There are thus several potential pays in the southern part of the basin.

GEOLOGICAL HISTORY: The Central basin platform consists of a thick limestone series of Permian age which was deposited over a complex surface. Some wells along the Fort Stockton high, extending west and northwest of Yates, pass directly from Permian limestones into granite. On the flanks of this high, Ellenburger and Simpson formations are found, and in Ward County Silurian limestone was picked up. These lower formations are folded into structures of the truncated anticlinal type, similar in many respects to Oklahoma City.

Following deposition of the Permian limestone, it was subjected to erosion, and because of its impure nature differential solution rendered it highly porous and permeable. The erosion was not entirely chemical, as is usual in limestone, but resulted in the formation of an impure clastic series containing much fragmental limestone as well as sand. This upper detrital material, which is frequently found on the flanks of the limestone highs, or reefs, carries oil although not in the same amount as the limestone highs themselves.

The limestone highs are locally folded, but the effect of this folding is largely to localize porosity along certain trends. It is thus apparent that the reservoir has played a passive role in the accumulation of oil, being merely a rock whose texture and composition was such that it became porous on weathering.

Following the erosion period, the limestone highs were submerged and covered by a clastic series of irregular thickness which pass upward into more anhydritic phases. Interbedded with the anhydrite, however, are large quantities of clastic material and some sand bodies, like the Yates sand, are sufficiently widespread to constitute markers. The Yates sand locally carries some oil and gas.



As evaporation continued salt was deposited and finally the deposition grades upwards into red beds which, during the Triassic, were entirely continental and contain gypsum. The southern part of the area was again submerged during the Cretaceous and sandstone, followed by the Edwards limestone were laid down.

As Adams visualizes the conditions which gave rise to the surface structure at Yates, the Yates sand must have been deposited on a practically horizontal plane. The limestone high was thus comparatively flat, as compared with its present character. Deposition of anhydrite and salt probably resulted in some compaction and settling, with the result that these formations were thicker on the flanks than over the crest of the high. Reelevation of the high permitted water to circulate through the salt section and the salt was removed from over the high and a syncline formed which was filled with clastic material. Subsequent movements resulted in the formation of a superimposed structure as shown in the accompanying cross-section.

Although the surface structure at Yates is stronger than in other West Texas areas, it is not unique. The significant feature of the surface structure is not, however, the central surface high so much as the flanking narrow synclinal troughs. These can be found surrounding other fields, such as Big Lake.

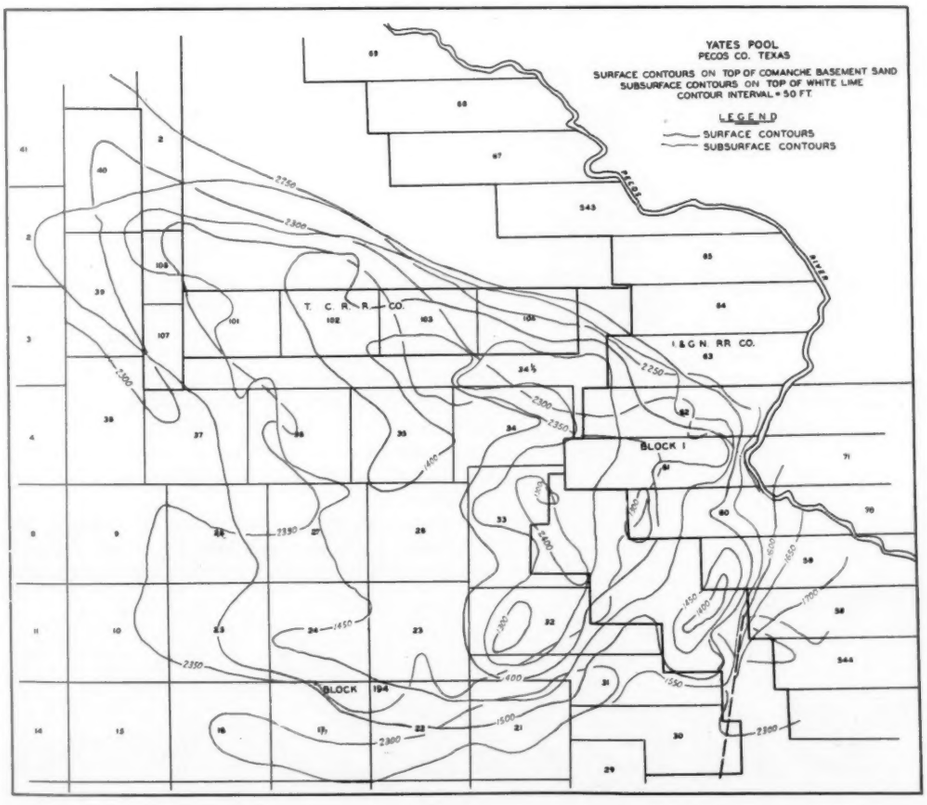
ORIGIN OF THE OIL: There have been many explanations offered for the origin of the oil at Yates and in the other limestone highs which have made West Texas one of the richest oil areas known. Some consider that the oil moved updip from shale deposits on the flanks, others that the oil-forming materials entered the porous limestone masses when they were submerged beneath the upper Permian sea and before the evaporation of that sea became too pronounced. The most significant fact in connection with the origin of the Permian oil of West Texas is that there are no "source rocks" in the commonly accepted sense of the word. It thus appears that wherever a limestone body has been subjected to erosion and made porous and has then been submerged again, it may contain oil.

OTHER FIELDS OF THE SAME TYPE: Hendricks, Big Lake, McElroy, Hobbs, Eunice-Monument, Wasson, Slaughter, Goldsmith and many other West Texas fields are similar to Yates, except for the strong surface features noted above. The "Golden Lane" of Mexico and the Miocene limestone fields of Iran and Iraq are other examples. The Trenton oil and gas fields of Ohio, the Devonian limestone accumulations of Michigan and Kentucky are also of the same type, although their structure is not so pronounced. Accumulations in the Arbuckle limestone of western Kansas are also in flatter structures or highs in which the porosity was due to erosion and the same is true of the Kansas City-Lansing pay in the same region.

Local structural conditions in many of these areas prevent a clear-cut distinction between the buried limestone reef or hill and truncated anticlines. In all cases, however, the porous limestone which forms the reservoir owes its porosity to the erosion which took place while it was uplifted above the surface of the sea. Whether the uplift was accompanied by differential movements or not makes little difference to the accumulation of oil.

EXPLORATION METHODS: A limestone high, whether it occurs as a buried hill or on a fold is often reflected in gentle structures at the surface. Frequently, if the high lies on the flank of a major structure, this surface manifestation of the buried high is a nosing or a terracing. Closure at the surface is not, therefore, necessary over a buried limestone reservoir. Subsurface methods, through observation of thinning of formations toward the high often disclose its presence. Where it is not capped by a thick limestone seismic methods will disclose the presence of limestone highs but the tendency for overlying limestones to thin over buried limestone highs makes their detection by gravimetric methods more difficult.

Detection of limestone highs is, at the best, difficult unless they lie on strong regional structural features. Trend lines frequently afford valuable clues to their detection. The fact that they often give no evidence at the surface of their existence will result in the occasional success of random drilling.



Left: Map showing structure of Yates field on top of Comanche basement sand and top of white lime. Right: Oil-field map of Yates area. Principal references: Yates Field, Pecos County, Texas, by G. C. Gester and H. J. Hawley, Structure of Typical American Oil Fields, Vol. 2, pp. 480-99, Structural Development, Yates Area, by John Emery Adams, A.A.P.G. Bulletin, Vol. 24, No. 1

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drilled for every 4.66 ft. of dry hole. One discovery well was drilled for every 5.48 dry holes. The average depth of hole was 3,559 ft.

In the southern-states district (Fig. 2), in 1941, a total of 6,843,749 ft. was drilled in 1,563 holes, divided as follows:

258 producers	1,264,774 ft.
1,305 dry holes	5,578,975 ft.

In this area, then, 16.51 per cent of the holes drilled, and 18.48 per cent of the footage drilled, was successful. One producer foot was drilled for every 4.41 ft. of dry hole. One discovery well was drilled for every five dry holes. The average depth of hole was 4,372 ft. For comparison with statistics for this same area in 1938, 1939, and 1940, see Table 2.

Selection of the location for a wildcat well may be based on geology (surface geology, subsurface geology, trend along known structural or stratigraphic conditions, local or regional, or shallow exploratory drilling); or it may be based on geophysics (exploration by seismograph, torsion balance, gravity meter; magnetometer, etc.); or it may be based on some nontechnical suggestion or requirement, such as "creekology," "hunch," "doodlebug," promotion, lease obligation, reported showing of oil or gas in holes previously drilled, etc. In many cases the reason for choosing the location cannot be ascertained.

In Table 3 are listed the reasons for drilling the wildcats in 1941 using the best information available from men familiar with such statistics, each in his own state or district. According to these figures, 471 wildcats drilled on technical advice (geology and/or geophysics) were successful (oil or gas), and 1,928 were dry; 30 holes located for nontechnical reasons were producers, and 771 were dry; 2 producers and 62 dry holes were located for reasons unknown. These figures show that 19.5 per cent of the holes drilled on technical advice were producers as contrasted with 3.7 per cent successful in the case of the holes located without technical advice. Therefore, in 1941, locations based on technical recommendations were more than five times as successful as those drilled without such advice. In the southern states (Fig. 2), 3.5 per cent of the wildcats, located without technical advice, were producers, whereas 19.8 per cent of the holes located on technical advice were producers.

Comparing last year's figures[2] with figures for 1941, we note the following conspicuous changes.

1. There was a considerable increase in wildcat drilling in California (up from 104 holes in 1940 to 124 holes in 1941); in Texas (up from 1,091 holes in 1940 to 1,210 holes in 1941); in Kansas (up from 145 holes in 1940 to 237 holes in 1941); in Louisiana (up from 174 holes in 1940 to 202 holes in 1941); and in Illinois (up from 523 holes in 1940 to 591 holes in 1941).

2. There was a conspicuous drop in wildcatting in Michigan (down from 354 holes in 1940 to 231 holes in 1941); and in Mississippi (down from 109 holes in 1940 to 52 holes in 1941).

Footage figures vary roughly in the same proportions both under Paragraph 1 and Paragraph 2.

3. The number of successful holes (discovery wells) out of the total number of wildcats drilled on technical advice rose from 15.6 per cent in 1940 to 19.5 per cent in 1941; and, on the contrary, successful holes drilled without technical advice decreased from 4.2 per cent to 3.7 per

TABLE 1—NUMBER OF OIL WELLS, GAS WELLS AND DRY HOLES, DRILLED AS WILDCATS IN 1941

States—	Oil discovery		Gas discovery*		Dry		Total No. of holes	Total footage drilled	Average depth of holes (ft.)†
	No. of holes	Footage drilled	No. of holes	Footage drilled	No. of holes	Footage drilled			
Alabama	....	.....	....	....	14	20,816	14	20,816	
Arkansas	4	30,734	1	8,914	35	111,525	40	151,173	3,779
California	13	74,611	3	12,441	108	553,418	124	640,470	5,165
Colorado	....	.....	....	.....	3	15,585	3	15,585	....
Florida	....	.....	....	.....	1	600	1	600	....
Georgia	....	.....	....	.....	1	1,935	1	1,935	....
Illinois	83	214,340	1	2,655	507	1,124,748	591	1,341,743	2,270
Indiana	13	23,930	2	1,532	98	162,214	113	187,676	1,661
Iowa	....	.....	....	.....	6	14,277	6	14,277	....
Kansas	33	123,831	4	16,453	200	688,189	237	828,473	3,494
W. Kentucky	4	4,999	....	.....	51	77,799	55	82,798	1,505
Louisiana	18	175,927	13	87,102	171	1,080,312	202	1,343,341	6,650
Michigan	8	13,407	8	22,018	215	480,544	231	515,969	2,234
Mississippi	2	9,180	....	.....	50	241,793	52	250,973	4,826
Missouri	....	.....	....	.....	6	13,584	6	13,584	....
Montana	1	2,065	2	6,794	9	32,613	12	41,472	....
Nebraska	2	4,782	....	.....	32	80,529	34	85,311	2,509
New Mexico	5	11,126	1	2,870	37	91,282	43	105,278	2,406
Ohio N.W.	....	.....	....	.....	12	20,353	12	20,353	....
Oklahoma	54	209,671	12	43,521	180	657,777	246	910,969	3,703
South Carolina	....	.....	....	.....	2	2,117	2	2,117	....
Tennessee	....	.....	1	1,598	17	25,880	18	27,478	....
Texas	176	731,678	38	207,243	996	4,030,415	1,210	4,969,336	4,106
Wyoming	....	.....	1	3,955	10	39,403	11	43,358	....
Total	503	1,630,281	87	2,047,377	2,761	9,567,708	3,264	11,615,085	3,559

*Gas and distillate wells, of which there were 27, are included in this column. †Averages have been recorded here only for states where more than 25 holes were drilled in 1941.

TABLE 2—COMPARATIVE STATISTICS FOR ALL STATES SHOWN IN FIG. 2

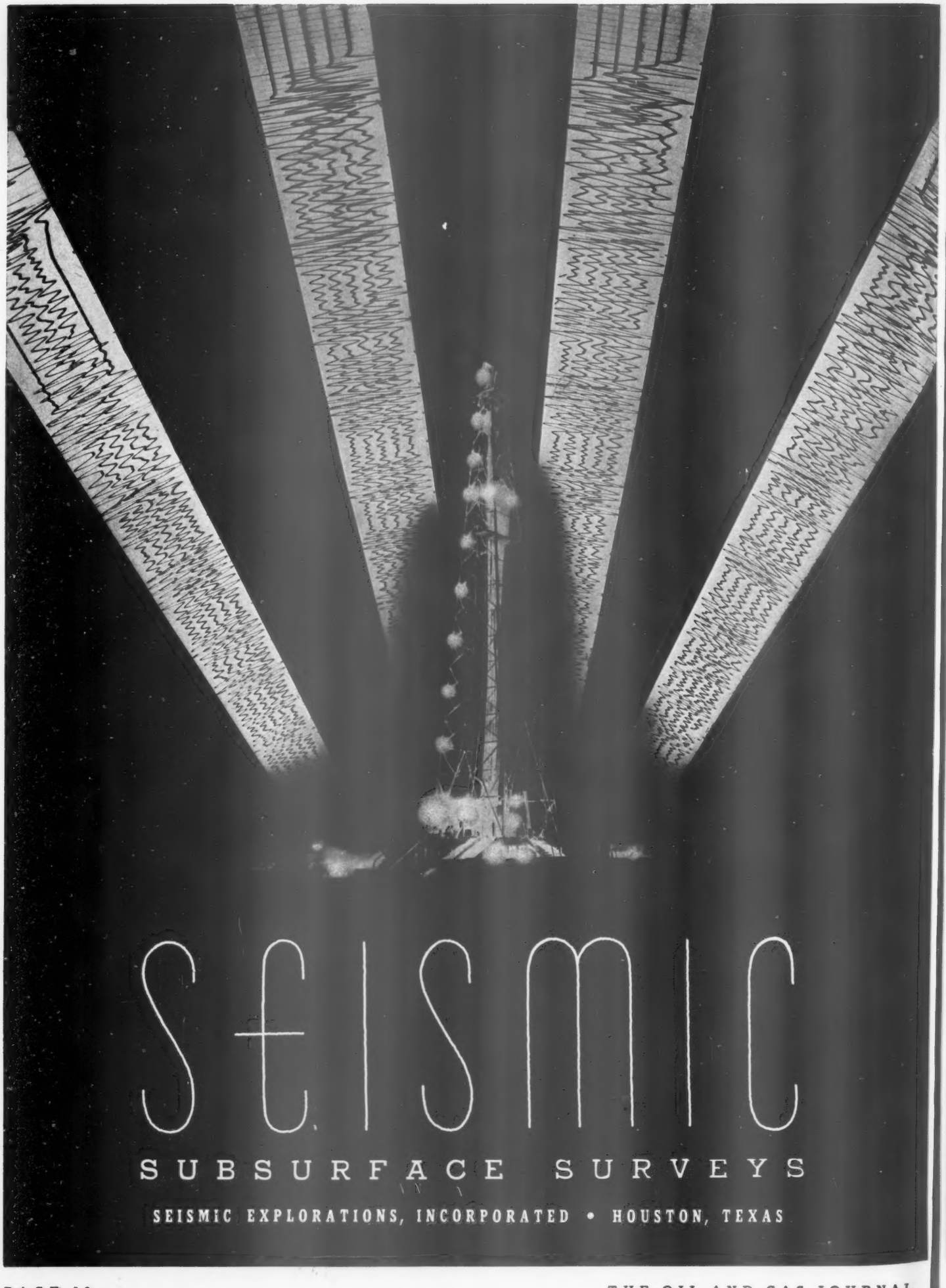
	Producers drilled				Dry holes drilled				Total No. wildcats drilled	Average depth of hole (ft.)	No. of dry-hole feet drilled for each producer foot
	Holes		Footage		Holes		Footage				
	No.	Per cent	Feet	Per cent	No.	Per cent	Feet	Per cent			
1938	200	13.6	984,262	17.4	1,271	86.4	4,667,402	82.6	1,471	3,842	4.74
1939	161	12.6	779,345	14.8	1,113	87.4	4,501,669	85.2	1,274	4,145	5.90
1940	187	12.8	919,506	*14.9	1,279	87.2	*5,251,273	*85.1	1,466	*4,209	*5.71
1941	258	16.5	1,264,774	18.4	1,305	83.5	5,578,975	81.6	1,563	4,372	4.41

*See bulletin of the American Association of Petroleum Geologists, Vol. 25, p. 1938, where corrections are mentioned for these figures as they appeared in Table 2, p. 1001, of the same volume.

TABLE 3—BASIS FOR LOCATING WILDCATS DRILLED IN 1941

State—	Geology		Geophysics*		Geology and geophysics		Sundry nontechnical		Unknown		Total	
	Prod.	Dry	Prod.	Dry	Prod.	Dry	Prod.	Dry	Prod.	Dry	Prod.	Dry
Alabama	....	3	....	....	....	....	....	11	....	....	....	14
Arkansas	....	21	5	8	....	....	....	6	....	....	5	35
California	10	59	6	5	....	20	....	19	....	5	16	108
Colorado	....	1	....	1	....	....	....	....	....	1	....	3
Florida	....	....	....	....	....	....	....	1	....	....	....	1
Georgia	....	....	....	....	....	....	....	1	....	....	....	1
Illinois	56	240	28	63	....	6	....	173	....	25	84	507
Indiana	13	69	....	5	2	6	....	16	....	2	15	98
Iowa	....	4	....	1	....	....	....	1	....	....	....	6
Kansas	22	81	8	24	1	11	6	84	....	....	37	200
Western Kentucky	4	35	....	2	....	....	....	14	....	....	4	51
Louisiana	8	59	22	87	1	2	....	22	....	1	31	171
Michigan	9	107	....	....	....	....	7	108	....	....	16	215
Mississippi	....	9	1	12	1	8	....	20	....	1	2	50
Missouri	....	3	....	2	....	....	....	1	....	....	....	6
Montana	2	2	....	....	....	2	....	1	1	4	3	9
Nebraska	2	7	....	6	....	....	....	19	....	....	2	32
New Mexico	4	20	....	2	1	3	1	11	....	1	6	37
Northwest Ohio	....	6	....	....	....	....	....	5	....	1	....	12
Oklahoma	30	89	30	44	....	2	6	45	....	....	66	180
South Carolina	....	....	....	....	....	....	....	2	....	....	....	2
Tennessee	....	10	....	2	....	....	1	5	....	....	1	17
Texas	140	546	43	173	22	51	9	206	....	20	214	996
Wyoming	....	9	....	....	....	....	....	....	1	1	1	10
Total	300	1,380	143	437	28	111	30	771	2	62	503	2,761

*Including geochemistry.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cent of the total number of wildcats drilled without technical advice.

4. Last year and in the preceding year[3] we called attention to the fact that, whereas in 1937 there were three times as many discovery wildcats drilled on technical advice as there were drilled for nontechnical reasons, in 1938 this factor had decreased to between 2.2 and 3.2, and in 1939 it had further decreased to between 1.5 and 2.2. In 1940 this factor jumped to 3.7, and in 1941 it increased further to over 5. There has been a growing tendency to seek technical advice before selecting a wildcat location, and especially is this true where deep drilling is contemplated.

Wildcatting is the industry's method of seeking new oil. From the experience of 1941 we might say that one wildcat in a little better than six is successful—and this takes into consideration not only all oil discovery wells but also those which discover gas or distillate. After a successful wildcat has been completed as a producer, other wells are subsequently drilled and these gradually outline the limits of the pool.

Where development is slow, or the pool is large, this process of outlining the pool may require several years. There is always a lag. After the first well has been completed, or perhaps after several wells have been completed, an estimate can be made of the quantity of oil present in the drilled area, and this area is taken as essentially proved. If the pay sand is thick and uniform and fairly even in its permeability, a larger acreage may be regarded as "proved" by the drilling than in the case where the sand is thin, irregular in permeability, and likely to pinch out. If the form and dimensions of the structure, or "trap," are pretty definitely known, an early estimate may be attempted of the quantity of oil present in the whole reservoir, including its undrilled parts. This is an attempt to guess at the ultimate total reserve rather than at the proved part of this ultimate total reserve.

Methods of Estimating Reserves

Both of these methods of estimating reserves[4] are justified. Each has its definite uses, but the two should not be confused. Where estimates are made of proved reserves, additions and revisions are periodically necessary, and eventually, after a pool has been completely drilled, the original estimate of the proved reserve plus the subsequent additions and revisions may come somewhere near the total ultimate reserve as estimated near the beginning of development of the pool. However, it is evident that such an early estimate, based on scanty data, is likely to be in error, and the percentage error is likely to be much greater than the percentage error in an estimate of proved reserves, made at any given time.

Rate of discovery is the rate at which new oil reserves are discovered, but a graphic picture of this rate may vary considerably according to whether we regard as the oil discovered in any given year the quantity of new oil proved by drilling in that year, or the quantity of total new oil estimated to fill the reservoir, or reservoirs, discovered in that year. Although in overlapping periods of several years each, the pictures might be somewhat similar, in single-year intervals there may be wide discrepancies between the rate of discovery calculated in the two ways, due to lag in development, size of pool, etc.

The suggestion has been offered that a more correct picture of the rate of discovery could be obtained by annually relegating back to the year of discovery the reserves subsequently uncovered each year by drilling; but this would not only involve an enormous amount of work, but also, in the end, as far as we can see it, there would be little gained. For of what particular value would it be for us to know, merely as a means of gaging discovery rate, that a reserve of over 4 billion barrels of oil was found in 1930 in the East Texas field? Of more significance—again, only as applied to the study of discovery rate—is the quantity of new oil made available each year as drilling of this field progressed. We repeat that, while there are real and important reasons for making early estimates of total ultimate reserves in a pool, we believe the soundest method of measuring rate of discovery must be based on new reserves as proved by drilling.

With this preamble behind us, let us examine statistics on proved reserves and wildcatting for the last 5 years.[5] Since complete data are not available for all states, we shall limit the succeeding discussion to the following 11 states as a group: Arkansas, California, Illinois, Indiana, Kansas, Louisiana, Michigan, Mississippi, New Mexico, Oklahoma, and Texas. As may be seen by comparing certain items in Tables 5 and 6 with the data in Table 4, these 11 states together include a large proportion both of the proved oil reserves and of the wildcatting activities of the country.

Table 4 requires no special comment.

Table 5 lists statistics on wildcat drilling in

TABLE 4

Year	Estimated proved reserves in United States (in barrels) at beginning of year	Year	Wildcats drilled during year indicated* Number	Footage
1937	13,063,000,000	1937	2,224	8,387,615
1938	15,507,268,000	1938	2,638	8,860,484
1939	17,348,146,000	1939	2,589	8,624,602
1940	18,483,012,000	1940	3,038	10,144,870
1941	19,024,515,000	1941	3,264	11,615,085
1942	19,589,296,000	1942	...	...

*These figures for reserves include the entire United States, but for wildcats they include all states regarded as prospective for oil except New York, Pennsylvania, eastern Ohio, West Virginia, and eastern Kentucky.

The above figures on reserves were taken from "Facts and Figures," 7th ed., p. 74, published by the American Petroleum Institute, 1941. Figures for reserves as of January 1, 1942, were taken from a recent press release from the American Petroleum Institute. The data for wildcats were taken from the articles printed in the A.A.P.G. Bulletin, and listed in footnotes.

TABLE 5—STATISTICS ON WILDCATS IN AREA UNDER CONSIDERATION*

	Located on technical basis				Nontechnical location				Unknown basis for location				Total				Grand total of wildcats	Total footage		Number of feet in dry holes drilled per foot in producing wildcats
	Producers		Dry holes		Producers		Dry holes		Producers		Dry holes		Producers		Dry holes			Producers	Dry wildcats	
	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%				
1937	214	16.05	1,119	83.95	17	5.80	276	94.20	48	9.21	473	90.79	279	12.99	1,868	87.01	2,147	1,188,366	7,002,875	5.89
1938	283	17.93	1,295	82.07	43	7.61	522	92.39	17	4.67	347	95.33	343	13.68	2,164	86.32	2,507	1,482,889	7,119,867	4.80
1939	216	13.33	1,404	86.67	43	6.15	656	93.85	10	4.85	196	95.15	269	10.65	2,256	89.35	2,525	1,107,395	7,344,424	6.63
1940	309	15.69	1,660	84.31	35	4.57	731	95.43	11	8.09	125	91.91	355	12.37	2,516	87.63	2,871	1,397,496	8,416,015	6.02
1941	463	20.17	1,832	79.83	29	3.92	710	96.08	0	0	55	100.00	492	15.92	2,597	84.08	3,089	2,023,184	9,222,217	4.55
Total, 1937-1941	1,485	16.88	7,310	83.12	167	5.45	2,895	94.55	86	6.70	1,196	93.30	1,738	13.22	11,401	86.78	13,139	7,199,330	39,105,398	5.42

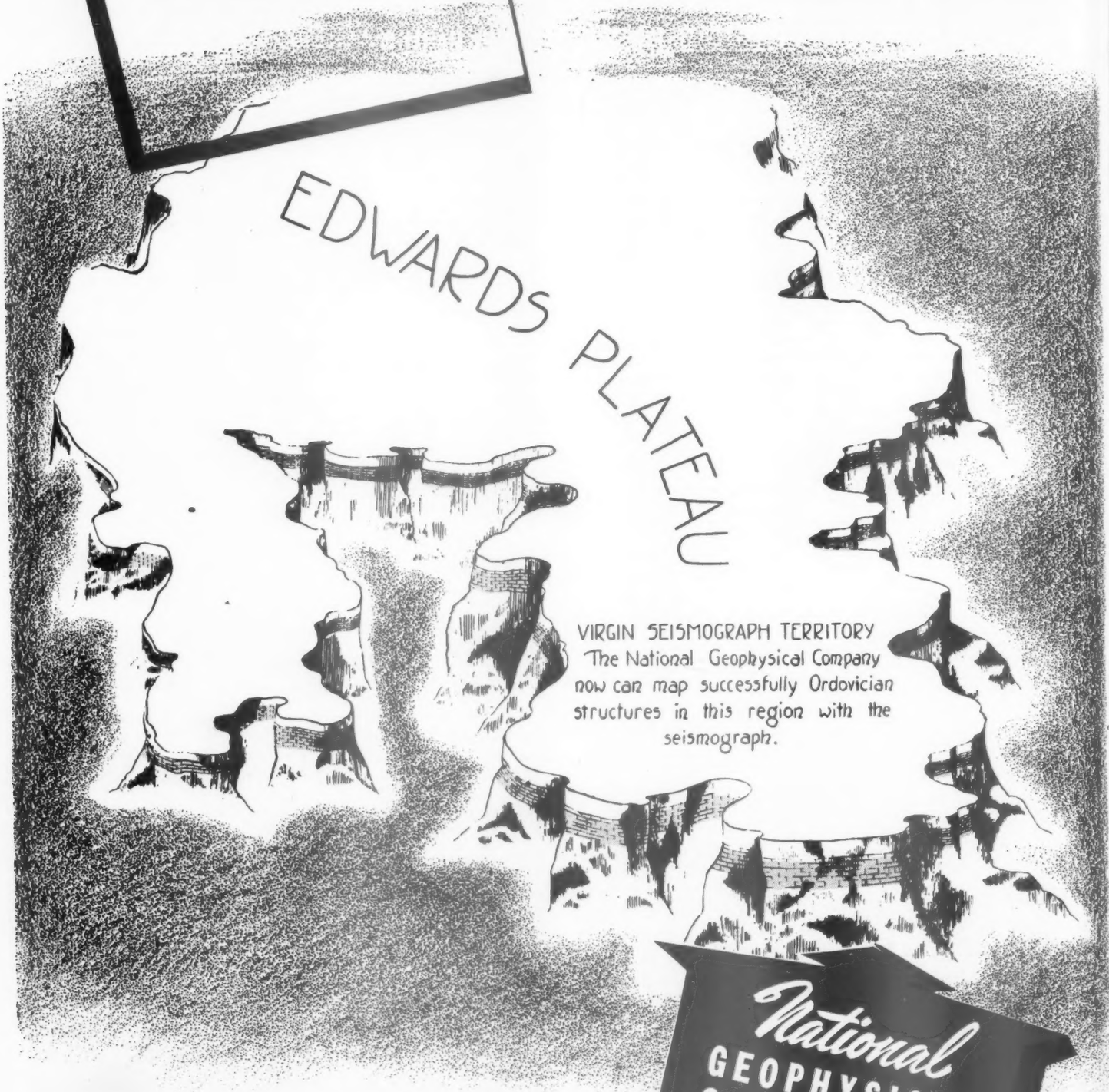
*This area includes California, New Mexico, Texas, Oklahoma, Kansas, Arkansas, Louisiana, Mississippi, Illinois, Indiana, and Michigan. Full statistics were not available on the other producing states.

TABLE 6—STATISTICS ON PROVED RESERVES IN AREA OF 11 STATES*

	1937	1938	1939	1940	1941	1942
A. Proved reserves as of January 1 of year indicated	12,241,885,000	14,664,035,000	16,630,452,000	17,723,393,000	18,226,542,000	18,816,785,000
B. Net change in proved reserves since January 1 of previous year	.....	+2,422,150,000	+1,966,417,000	+1,092,941,000	+503,149,000	+590,243,000
C. New proved reserves discovered during year indicated	896,692,000	805,293,000	337,989,000	280,882,000	423,551,000	.....
D. New reserves added through extensions and revisions of old fields during year indicated	2,739,254,000	2,313,356,000	1,955,507,000	1,505,816,000	1,496,610,000	.....
E. Total new proved reserves added (C+D)	3,635,946,000	3,118,649,000	2,293,496,000	1,786,698,000	1,920,161,000	.....
F. Production during year indicated	1,213,796,000	1,152,231,000	1,200,555,000	1,283,490,000	1,329,918,000	.....
G. Years of remaining proved supply on January 1 of year indicated, based on production of preceding year	†11.74	12.08	14.43	14.76	14.20	14.15
H. Newly discovered reserves (C) per wildcat hole drilled in year indicated	417,647	321,217	133,857	97,834	137,115	.....
I. Newly discovered reserves (C) per foot of wildcat hole drilled in year indicated	109.4	93.6	39.9	28.6	37.7	.....
J. Newly proved reserves (E) per wildcat hole drilled in year indicated	1,693,500	1,243,976	908,315	622,326	621,612	.....
K. New proved reserves (E) per foot of wildcat hole drilled in year indicated	443.88	362.52	271.36	182.07	170.75	.....

*This area includes Arkansas, California, Illinois, Indiana, Kansas, Louisiana, Michigan, Mississippi, New Mexico, Oklahoma and Texas. †Production in 1936: 1,042,464,000 bbl.

We Can Do it HERE'S A "TOUGHIE" THAT NATIONAL HAS SUCCESSFULLY SURVEYED... *The Edwards Plateau Region*


EDWARDS PLATEAU
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The National Geophysical Company now can map successfully Ordovician structures in this region with the seismograph.

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the area of the 11 states mentioned. These wildcats have been classified according to the reason for locating them where they were drilled, and also according to whether they were completed as producers of oil or gas or were abandoned as dry holes. In the 5-year period, 16.88 per cent of the wildcats located on a technical basis (geology or geophysics or both) were producers; 5.45 per cent of the wildcats located on the basis of various nontechnical reasons were producers; i.e., where the reason for the location was known, in collecting the statistics, those wildcats located on a technical basis were more than three times as successful as those located without technical advice.

During this 5-year period, 5.43 ft. of dry hole were drilled for every foot drilled in the producer wildcats.

There are several ways of estimating the degree of success of wildcat drilling. We have called successful those wildcat holes (and the footage drilled in these holes), which were completed as commercial producers. However, we can consider wildcatting in relation to oil reserves discovered by this class of drilling. In Table 6, under *A*, are recorded the proved reserves as of January 1 in each of the indicated years, and for the 11-states area under discussion. Under *B* is shown, for each January 1, the net change in estimated proved reserves since the preceding January 1, allowing for production during that 12-month period. Under *C* are the new reserves which are directly attributable to wildcat discoveries made during the year. Under D are the revisions and additions of estimated reserves in fields already discovered in previous years, these revisions and additions having been made on the basis of new information obtained through development during the year indicated.

As we have explained above, the reserves in Group D might be assigned back to the year of discovery, but due to the present incompleteness of available statistics, this cannot readily be done. Instead, we may regard both groups of new reserves (*C* and *D*) as directly and indirectly resulting from original wildcat discoveries. If, for each year, we divide the newly discovered reserves (*C*, Table 6) by the number of wildcats drilled in that year, or by the total wildcat footage drilled in that year, we shall have a measure of the degree of success of wildcatting in terms of newly discovered reserves (*H* and *I*, Table 6); and if we divide the total new reserves (discoveries plus revisions plus extensions: *E*, Table 6) by the number of wildcats drilled, or by the total wildcat footage drilled, we shall have a measure of the degree of success of wildcatting assisted by outpost drilling (*J* and *K*, Table 6). Under *H* and *I* the measure is short. Under *J* and *K*, the measure may be too large or too small. In any case there is an unavoidable error in estimating rate of discovery, or degree of success in wildcatting, measured in terms of new reserves; but the figures obtainable by these methods, as above described, are a significant index. They reveal a regular drop in rate of discovery through the first 4 years with a flattening of the curve through 1941, whichever way we compare the data. (See Fig. 3).

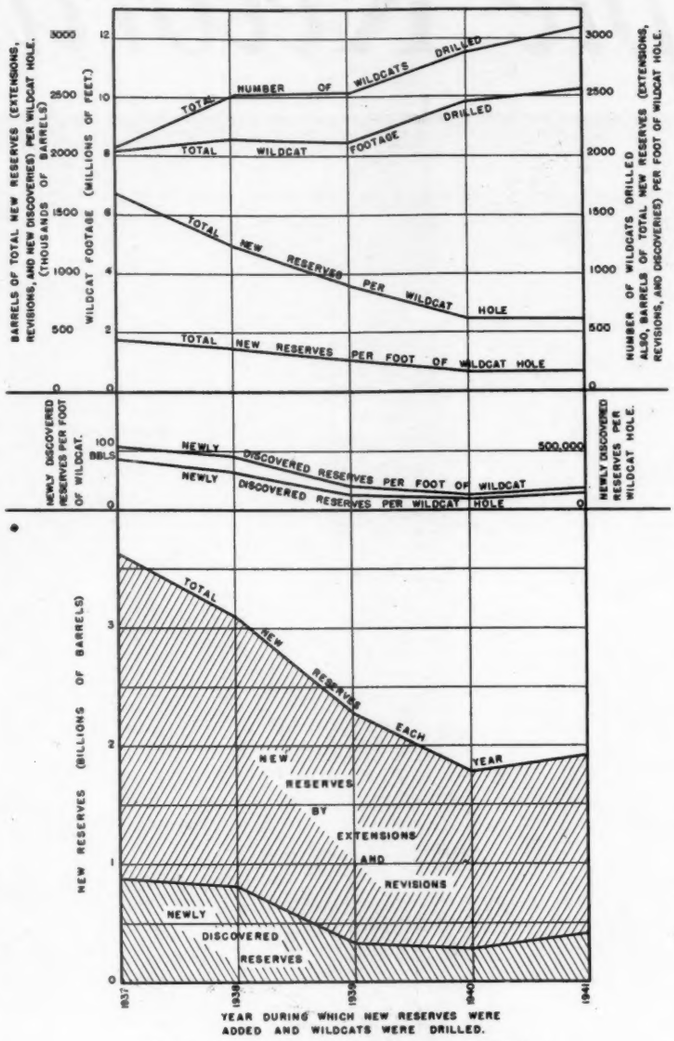
BARRELS OF TOTAL NEW RESERVES (EXTENSIONS, REVISIONS, AND NEW DISCOVERIES) PER WILDCAT HOLE. (THOUSANDS OF BARRELS)
WILDCAT FOOTAGE (MILLIONS OF FEET)
NUMBER OF WILDCATS DRILLED
ALSO, BARRELS OF TOTAL NEW RESERVES (EXTENSIONS, REVISIONS, AND DISCOVERIES) PER FOOT OF WILDCAT HOLE.
TOTAL NUMBER OF WILDCATS DRILLED
TOTAL WILDCAT FOOTAGE DRILLED
TOTAL NEW RESERVES PER WILDCAT HOLE
TOTAL NEW RESERVES PER FOOT OF WILDCAT HOLE
NEWLY DISCOVERED RESERVES PER FOOT OF WILDCAT.
NEWLY DISCOVERED RESERVES PER WILDCAT HOLE.
NEWLY DISCOVERED RESERVES PER FOOT OF WILDCAT
NEWLY DISCOVERED RESERVES PER WILDCAT HOLE
NEW RESERVES (BILLIONS OF BARRELS)
TOTAL NEW RESERVES EACH YEAR
NEW RESERVES BY EXTENSIONS AND REVISIONS
NEWLY DISCOVERED RESERVES
YEAR DURING WHICH NEW RESERVES WERE ADDED AND WILDCATS WERE DRILLED.

Fig. 3—Charts showing discovery rates 1937-41

Discoveries More Difficult

What is the significance of this falling rate of discovery? It cannot be due to lessened activity in wildcatting, for, except for a temporary setback in 1939, the number and average depth of wildcats has increased through the 5-year period. (See Fig. 3). Nor can it be due to any lessened application of technical methods in exploration, for there has been a steady advance in the refinement and use of techniques. We believe it is due mainly to the growing difficulty of finding new geological traps for oil. The more conspicuous and easily mapped structures have long ago been located and drilled. Also, drilling has tested most of the shallower prospects on these structures. Remaining undiscovered reserves are largely either (1) in regions not yet explored; or (2) they are in reservoirs deeper than those reached on already exploited structures and often unconformably related to the strata that contain the known reserves; or (3) they are in reservoirs of the stratigraphic pinch-out type, which can seldom be located by surface observations.

To look for oil under the first of these conditions will need increased activity in exploration and in drilling in areas which do not now produce oil, but which are rated as having some prospects.[6] To look for oil under the second of the conditions just mentioned will require deep wildcatting and also deeper drilling on known structures or within the confines of known pools. To look for oil under the third condition will require the drilling of many holes, some of which may be purely informational but all of which will help in locating the positions and trends of subsurface stratigraphic pinchouts. If we are to maintain a satisfactory discovery rate, as applied to new reserves, we must become more vigorous than heretofore in our wildcatting campaign. We must show a strongly rising curve in the annual number, and in the annual average depth, of wildcat operations. The picture, as we see it today, is a grave challenge to the industry as a whole to expand its program of exploration and to encourage any branch of research that may give us new or better methods of looking for oil.

References

1. A.A.P.G. Bulletin, Vol. 21, pp. 1079-82; Vol. 22, pp. 645-48, 1231-35, 1236; Vol. 23, pp. 789-94; Vol. 24, pp. 953-58; and Vol. 25, pp. 997-1003, 1938, 1939.
2. F. H. Lahee, "Wildcat Drilling in 1940," Bull. A.A.P.G., Vol. 25, No. 6 (June 1941), pp. 997-1003; and note corrections, ibid., mentioned pp. 1938, 1939, in the October number.
3. F. H. Lahee, "Wildcat Drilling in 1939," Bull. A.A.P.G., Vol. 24, p. 958; and "Wildcat Drilling in 1940," ibid., Vol. 25, p. 1003.
4. See F. H. Lahee, "This Matter of Estimating Oil Reserves," Bull. A.A.P.G., Vol. 25, pp. 164-166, 1941.
5. Information on proved reserves is taken from the American Petroleum Institute Quarterly, in April of each year from 1937 to 1942, inclusive. Information on wildcatting is from papers listed in footnote 1, p. 2.
6. See "Possible Future Oil Provinces of the United States and Canada." Edited by A. I. Levorsen. Bull. A.A.P.G., Vol. 25, pp. 1433-1586, 1941.

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A A.P.G. Abstracts

(Continued on Page 46)

importance locally than structural position in determining successful well locations. Over 25 separate gas productive lenses and five separate oil productive lenses of variable sizes and shapes are already known to occur in the Hiawatha member of the Wasatch formation.

Four fields, namely, East Hiawatha, West Hiawatha, Powder Wash and Canyon Creek have found commercial volumes of natural gas in Wasatch sand lenses. Two of them, East Hiawatha and Powder Wash are productive of commercial quantities of petroleum, as well as natural gas, from the same Wasatch formation.

The economical development of petroleum and natural-gas fields in the lenticular and somewhat erratic sands of the continental Wasatch formation involves production problems and hazards not common to the more regular sand reservoir fields.

●

R. E. BAXTER (Colorado School of Mines, Golden, Colo.), and HARRY A. AURAND (Consulting Geologist, Denver, Colo.)

Oil Shales of the Rocky Mountain Area

Great areas of oil shale occur in the Rocky Mountain area. These shales, when subjected to destructive distillation, yield oil in varying quantities. Relatively little is known about the retorting of the shales on a commercial scale, the methods or costs of mining, or the probable value and expense of disposing of the spent shale.

The main value of the oil derived from the

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retorting of the shales apparently lies in the special products such as high-grade lubricating oils and medicinal materials such as ichthyol.

●

N. W. BASS (U. S. Geological Survey, Washington, D. C.), and HAROLD M. SMITH (U. S. Bureau of Mines, Bartlesville, Okla.)

Geologic Relationship of Crude Oil in the Tow Creek, Wilson Creek, Iles, and Moffat Fields, Colorado

A comparison of the composition of crude oils from six zones ranging in age from Jurassic to Cretaceous in the Tow Creek, Wilson Creek, Iles,

N. W. BASS

HAROLD M. SMITH

and Moffat fields, and oil from a seep at Tow Creek, Colorado, shows that, except at Wilson Creek, the oil in each pool is unlike the oil in all other pools of these fields, whether at the same or a different stratigraphic position. In the Wilson Creek field the oil from the Sundance formation is similar to the oil from the overlying Morrison formation. These facts may indicate that, except at Wilson Creek, the source of the oil of each pool was local to that pool; or the data may indicate that the oil of the several pools was at one time similar and was affected differently during the folding and faulting that formed the domes and anticlines. The oil in the Morrison formation at Wilson Creek may have migrated upward from the Sundance formation. The oil in the north Tow Creek pool and the oil in the seep at Tow Creek may have been altered by an intrusive body that occupies a large area in the north part of the Tow Creek anticline. On the other hand, the differences between the oils near the intrusive body are no greater than between oils in a region in Oklahoma containnig no intrusive bodies, which has been investigated recently by the research committee of the Tulsa Geological Society.

●

GEORGE V. COHEE (Illinois State Geological Survey, Urbana, Ill.)

Lateral Variation in the Chester Sandstones Producing Oil and Gas in the Lower Wabash River Area

Oil and gas production in the Wabash River Valley in southeastern Illinois and southwestern Indiana is from lower Pennsylvanian and Chester sandstones and the McClosky limestone of the Ste. Genevieve formation. The principal fields in the area are New Harmony Consolidated and Keensburg Consolidated. These fields include an almost continuous producing area from Keensburg, Wabash County, at the north, to a point 3½ miles southeast of Phillipstown, White County. This single area is approximately 18 miles long and varies in width from ½ mile to more than 2 miles at its widest point in White County. As of January 1, 1942, there were almost 1,000 producing wells in the two fields and the productive area proved by drilling was 7,238 acres.

All of the eight Chester sandstone formations and additional sandstone beds in other Chester formations were found productive in one place or another throughout the area. Considerable lateral variation in thickness and character of the "sands" was indicated by drilling. In many cases it was so great that it made the development of a particular sandstone uncertain from well to well. The lenticular character of producing "sands" resulted in irregular producing areas. The producing areas of the different "sands" may or may not be directly over or under each other. Many wells in the area are producing from more than one "sand."

Distribution of productive areas depends more upon sand characteristics than structure in the lower Wabash River area.

●

W. C. IMBT (Stanolind Oil & Gas Co., Wichita, Kans.), and P. A. HARPER (Cities Service Oil Co., Wichita, Kans.)

Viola Production in Eastern Stafford and Northwestern Reno Counties, Kansas

The area covered in this paper has three pools producing from the Viola formation. Listed in the order of discovery, they are: Zenith, Stafford, and Peace Creek. In the Zenith pool the Maquoketa or Misener overlies the Viola. In the Stafford pool Kinderhook shale lies on the Viola. In the Peace Creek pool occasionally a thin remnant of Misener sand is found on the Viola, which is overlain by Kinderhook shale. In the Zenith pool production is obtained from Misener sand, Maquoketa dolomite and cherty dolomite of the Viola. In the Peace Creek pool oil is produced from the cherty Viola dolomites. Production in the Stafford pool is from the Viola, and one well is producing from the Arbuckle.

Where present, the top of the Fernvale in this area is considered the top of the Viola. Fernvale limestone is present over most of the producing areas under consideration. Two pronounced unconformities are present: one between the Pennsylvanian and Mississippian, and the other between the Mississippian and Ordovician. Post-Fernvale—pre-Kinderhook erosion is shown by the absence of Maquoketa and Fernvale over considerable areas adjacent to the pools.

In the Peace Creek and Zenith pools accumulation is thought to be controlled by stratigraphic trap conditions, while in the Stafford pool accumulation is controlled by structure on the Viola.

●

Abstracts of A.A.P.G. Survey Of Developments in 1941

O. L. BRACE (Consulting Geologist, Houston, Tex.)

Review of Developments in 1941, Gulf Coast of Upper Texas and Louisiana

More refined methods of oil exploration have resulted in a slight increase in the discovery rate on the Texas Gulf Coast for 1941 but the generally second-grade type of individual pool that has resulted from exploratory activity during the past years still characterizes the discovery column. Coastal Louisiana has had a successful year, with 17 new productive areas but there is no one of these that seems at this time to compare with some of the outstanding discoveries of recent years.

Activity along the Eocene Wilcox trend has been rather successful in Texas for 1941 but has failed to result in a new discovery in Louisiana. Louisiana, however, has made impressive additions to the reserves of previously discovered fields by extension and through the opening of new producing sands.

●

JAMES R. DORRANCE (Texas Co., Bakersfield, Calif.)

California Exploration and Development in 1941

California's decline in discovery rate was sharply checked in 1941. Thirteen new areas of production were officially acknowledged. Eight are definitely established as fields, this figure including one new gas field. The status of the remaining five remains unsettled either by virtue of their imperfect state of development, or because subsequent drilling may prove them extensions of old fields. In addition, there were discovered three significant extensions to old fields, and a deep zone in one of the new fields of this year.

Increase in discovery rate was associated with increased exploratory effort as indexed by wildcat drilling, geophysical activity, and geological employment.

Although numerically impressive, the addition to reserves by 1941 discoveries was disappointing, amounting to a tenth or less than the year's production. Nevertheless, the year's record of improved discovery rate is encouraging, and implies that we may reasonably expect discoveries to continue with perhaps an occasional one of major proportion.

●

BERNERD A. RAY (Tide Water Associated Oil Co., Midland, Tex.), WILLIAM T. SCHNEIDER (Honolulu Oil Corp., Midland, Tex.), CHARLES TAYLOR COLE (University Lands, Midland, Tex.), EDGAR KRAUS (Atlantic Refining Co., Carlsbad, N. M.), and RONALD K. DeFORD (Argo Oil Corp., Midland, Tex.)

West Texas and Southeastern New Mexico Development in 1941

Development in West Texas was greater than in any year since 1937. A total of 2,325 wells were drilled, including those deepened and recompleted. Of these, 2,190 or 94 per cent were producers. The most active field was the Slaughter field which accounted for 678 wells or more than one-fourth of the producers drilled. A total of 135 wildcat wells (i.e., wells over 1 mile from production) were drilled, of which 27 were producers and 108 were dry holes. Nine of the wildcat wells established new areas of production; the remainder were produced from new levels in established areas or were considered extensions. Fifteen of the wildcats were completed from the various known Permian levels while two new levels, both in the lower Permian, were disclosed. Permian exploration was scattered over 43 counties and was more inclusive in the number of zones tested than in previous years.

Especially did pre-Permian drilling and exploration exceed that of past years. A total of 106 pre-Permian wells were completed. Of this number 21 were dry, 6 were plugged back to the Permian for producers, and 1 was a temporarily

abandoned gas well. This gives a percentage of dry holes of 15 per cent. Twenty-five of the pre-Permian tests could be considered wildcats and of these 10 were successfully completed as producers. The center of activity was in the Abell field in north central Pecos County. Here 56 wells were completed, including 6 wildcat producers, 1 dry hole, 6 wells which were plugged back to the newly discovered Permian zones, and the one temporarily abandoned gas well.

A definite trend toward deeper drilling has been accelerated by new discoveries in the lower Permian (Leonard), lower Pennsylvanian ("crinoidal"), and Ordovician and Cambrian (Simpson and Ellenburger) formations.

There was a decline of 31.5 per cent in the number of wells drilled in southeastern New Mexico in 1941. A total of 371 wells were drilled, of which 294 were oil wells, 7 gas wells, and 70 dry holes—the highest percentage of dry holes in the past several years. There were four new discoveries for the year. The most active area was the Maljamar pool, where 61 wells were completed, including 3 which were dry. The producing formations of the 1941 discoveries are the Yates, Seven Rivers, and Grayburg.

Geophysical activity has been conducted mainly with gravimeter and magnetometer.

●

LEWIS S. CORYELL (Cities Service Oil Co., Wichita Falls, Tex.), ROBERT ROTH (Humble Oil & Refining Co., Wichita Falls, Tex.), and DOLPHE E. SIMIC

New Developments in North and West Central Texas in 1941

During the year 1941, the North and West Central Texas districts developed important new production in the following stratigraphic formations:

Ellenburger dolomite (Cambro-Ordovician), three new discoveries and three found by deeper drilling.

Mississippian limestone, five new discoveries and two by deeper drilling.

Bend (Pennsylvanian), two new discoveries.

Caddo (Pennsylvanian), nine new discoveries.

Strawn (Pennsylvanian), nine new discoveries and three by deeper drilling.

Canyon (Pennsylvanian), one new discovery and one by deeper drilling.

Cisco (Pennsylvanian), three new discoveries and two by deeper drilling.

Wolfcamp (Permian), one new discovery.

The only new producing horizon discovered in the area was the Dothan limestone (Permian) in the Merkel pool in Taylor County. To date only one well is producing from this horizon.

●

ALBERT F. BARRETT (General Petroleum Corp., Casper, Wyo.)

Developments in the Rocky Mountain Region in 1941

The year 1941 was marked by continuation of a relatively active drilling campaign. In Wyoming the major development of light-oil production was in the Lance Creek field of eastern Wyoming; Cole Creek in Central Wyoming; and in the Wertz, Lost Soldier and Mahoney fields in the Lost Soldier district of South Central Wyoming. The major black-oil development was in the Oregon Basin, Frannie and Byron fields in the Big Horn Basin district of northern Wyoming and in the Maverick Springs field in the Wind River Basin of Central Wyoming. In Montana the active development was confined to the two major fields of the state, Cut Bank and Kevin Sunburst in the northern part of the state, both light-oil producers. In Colorado the active development was in the Wilson Creek field and in the Rangely shale-oil field, all light oil.

In several cases the development work resulted in extensions of oil-productive areas, in particular at Lost Soldier, Wertz, Cole Creek and Frannie in Montana; at Cut Bank and Kevin-Sunburst in Montana; and at Wilson Creek in Colorado. Two relatively important extensions of gas areas resulted from 1941 drilling; at Elk Basin in northern Wyoming and at Hiawatha in southwestern Wyoming.

At Wilson Creek in Colorado a new oil-producing zone (Sundance sand) was definitely proved to be commercially productive, which discovery, along with extensions of the higher Morrison sand area, added considerably to the estimated reserves for the field.

There were no important discoveries of new oil or gas-producing areas in the Rocky Mountain states during 1941. Results of three wildcat tests indicated discovery of new gas fields of as yet unknown importance at the following locations: Canyon Creek structure, Sweetwater County, southwestern Wyoming; Sherard dome, Carbon County, South Central Wyoming; and the Reagan structure on the Twin Rivers structural nose, Glacier County, northern Montana.

●

EDWARD A. KOESTER (Darby Petroleum Corp., Wichita, Kans.)

Developments in North Mid-Continent in 1941

The discovery of commercial production in a sandstone in the lower part of the Pennsylvanian system in Kearny County, Kansas, was the outstanding development in the North Mid-Continent region in 1941. The true importance of this discovery remains somewhat questionable at present because of the lack of development in its vicinity. Further exploration in this geologic province will probably be forestalled by war conditions.

Otherwise Kansas experienced a year of routine development in and around proven areas. There was a sharp increase in wildcat activity, with a consequent increase in the percentage of dry holes from 20.3 per cent to 26.9 per cent. Productivity developed by oil-well completions fell from about 2,200,000 bbl. to 1,700,000 bbl., and the average potential per well fell from 1,561 bbl. to 1,379 bbl. An important group of pools was found along the Peace Creek trend in southwest Reno County which will probably result in a large share of the drilling activity for 1942. These pools are northeast of the Zenith pool and have similar characteristics. Several small and relatively unimportant pools were found on the Central Kansas uplift, but except for the Ray pool in Phillips County attempts to develop important production in northwestern Kansas were relatively unsuccessful. Development of the McLouth pool in the Forest City basin continued.

In Nebraska the Falls City pool of Richardson County was enlivened by the discovery of a deeper pay in the Hunton dolomite. The Barada pool was discovered about the middle of the year, and gives promise of developing into a small pool similar to Falls City. Wildcatting elsewhere in both East and West Nebraska was unsuccessful although much stratigraphic information was secured.

●

JOSEPH L. BORDEN (Pure Oil Co., Tulsa, Okla.)

Developments in Oklahoma During 1941

Oklahoma's position improved during 1941 by increasing production about 2¼ million barrels to total 152,013,942 bbl. Estimated reserves at the close of 1941 were 1,035,820,000 bbl., an increase of 34,000,000 bbl. over 1940. The small gain in production and reserves in 1941 is the first hopeful sign in several years. Production increase is due largely to development of pools discovered prior to 1941. However, 43 new pool discoveries are listed for the year. Of these, Apache is the most important, but its discovery came too late in the year to materially affect production. An encouraging sign is the continued successful search for oil in the older areas, such as the Seminole region and Okfuskee County.

Geophysical activity was widespread and included all the present-day methods. There was an average of 25 seismograph parties operating in the state, totaling 281½ crew months of work, an increase of 36 crew months for the year. Nearly three-fourths of all the new discoveries are credited to seismograph crews. Gravimeters and magnetometers continued in use and the stratigraphic drill was used more than in previous years.

There were 2,162 wells drilled during the year, of which 1,489 produced oil or gas. Of these, 271 were exploratory wells drilled following the exploratory surveys. Seventy of these wells were completed as producers, and 43 are classed as new pool openers.

●

B. W. BLANPIED and ROY T. HAZZARD (Gulf Refining Co., Shreveport, La.)

Summary of Development in South Arkansas and North Louisiana During 1941

In South Arkansas, during 1941, "Travis Peak" production was discovered in the Smart sand area of the Stephens field of Columbia County.

B. W. BLANPIED

ROY T. HAZZARD

Cotton Valley production was discovered in the East Schuler field in Union County, and Smackover lime gas-distillate production in the Macedonia field, in Columbia County. Smackover lime oil production was discovered in the Mount Holly field, Union County, and in the Patton field, Lafayette County.

In North Louisiana during 1941 six Eocene Wilcox sand oil fields were discovered in La Salle Parish and two in Catahoula Parish, with one gas-producing area in Caldwell Parish.

Lower Cretaceous Pettit limestone oil production was discovered in the Haynesville field, Claiborne Parish, during 1941. Other Claiborne Parish discoveries are the Athens and North Lisbon fields where gas-distillate production was found in the "Travis Peak." Smackover lime gas-distillate production also was developed in the North Lisbon field, the only Smackover production to date in North Louisiana.

●

F. R. DENTON and R. M. TROWBRIDGE (Consulting Geologists, Tyler, Tex.)

Developments in East Texas During 1941

The market increase in exploratory tests in East Texas during 1941 resulted in the discovery of three oil fields. Two of these fields are producing from the Woodbine formation and one from the Rodessa zone of the lower Glen Rose formation.

In the Hawkins field, which was the major

1940 discovery, a rapid development program took place and 243 oil wells, 3 gas wells and 8 dry holes were drilled.

The number of completions in other proved fields exceeded that of 1940.

●

ALFRED H. BELL (Illinois State Geological Survey, Urbana, Ill.)

Development in the Eastern Interior Basin in 1941

More wells were drilled in 1941 in Illinois and southwestern Indiana than in any previous year except 1907 when drilling reached a peak in that area. Drilling declined in western Kentucky, making the total number of completions in the eastern interior basin in 1941 slightly less than in 1940. Much of the 1941 drilling (both pool and wildcat) was concentrated in the deep basin area in the region of the lower Wabash River in Illinois and Indiana were 44 new pools and 43 extensions were discovered. None of the new pools was of major size and the total output of new wells in the whole area failed to offset the decline of the older wells. Total production from the eastern interior basin in 1941 is estimated at 145,603,000 bbl. as compared with 154,796,000 bbl. in 1940, a decline of 6 per cent. Percentage of the national total was 10.3 in 1941 as compared with 11.5 in 1940.

Rocks of the Mississippian system continue to yield most of the oil in the area—some 91.5 per cent of the Illinois total of 133,750,000 bbl. in 1941. No new Devonian production was discovered in Illinois in 1941 and the Devonian wells, which yielded an estimated 26 per cent of the Illinois total in 1940, produced only 6 per cent of the total in 1941. Pennsylvanian and Ordovician strata yielded estimated amounts of 1.7 and 0.9 per cent respectively. Geological studies indicate that lenticular sand conditions are important in controlling the occurrence of the oil.

●

R. P. GRANT (Department of Conservation, State of Michigan, Lansing, Mich.)

Oil and Gas Developments in Michigan During 1941

During 1941 the "basin" was the most active district in Michigan due chiefly to development in the Reed City, Detroit River (Devonian) field in western Osceola County, the Headquarters Traverse (Devonian) field in southern Roscommon County, and extensive development of Michigan "stray" ("Mississippian") gas fields in Osceola, Missaukee, and Clare counties.

Ten new oil fields and extensions and six new gas fields were discovered during the year, with the "basin" taking the limelight insofar as new developments were concerned. The most important oil strike in southwestern Michigan was the West Hopkins Traverse (Devonian) field in Allegan County. Actual oil production dropped approximately 17 per cent below 1940.

More gas wells were drilled in 1941 than in any year since 1936. Actual gas production reached an all time high with 6 per cent increase over 1940. The Gulf Oil Co. 1 Bateson in the Kawkawlin field in Bay County was drilled to a depth of 10,445 ft. into the St. Peter (Ordovician) sandstone, but was plugged back to 7,800 ft. and kept as a condensate well. Late in December a gas well was discovered in Calhoun County in the Traverse (Devonian) limestone, opening up an entirely new area to development.

Technical Session of S.E.G. Reviews Year of Progress

THE Society of Economic Geophysicists met jointly with the other associations during the first 2 days of the meeting but are scheduled to hold a technical session tomorrow. As in previous years, the majority of the papers to be presented deal with refinements of existing methods and with the interpretation of anomalies. Abstracts of some of the papers dealing with the application of geophysical methods to specific problems or areas are given below.

●

L. E. DEACON (Shell Oil Co., Inc.)

An Analysis of Abnormal Reflexions

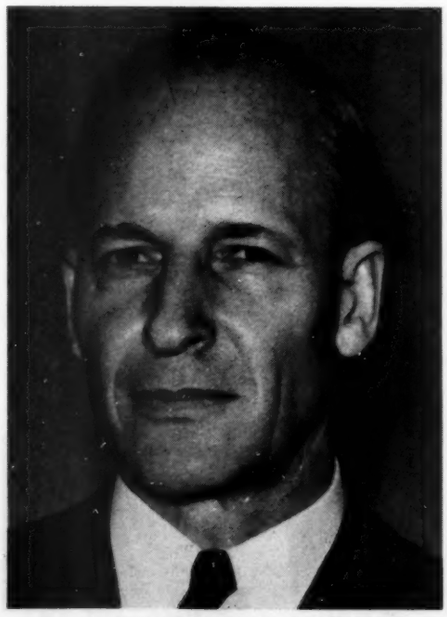
During the course of a reflexion survey of an area in Southwest Texas, a group of seismograms was obtained on which were recorded a number of events having abnormal apparent velocities. The dips computed from these events on the assumption that they were conventional reflexions in the plane of the profile were much larger than the anticipated stratigraphic dip. This paper presents a discussion of the possible origins of these events and considerable evidence that they originated on fault planes.

●

C. A. SWARTZ (Gulf Research & Development Co.)

Seismograph Evidence Regarding the Depth of the Salt in the Salt Dome Province of Southern Mississippi

In the salt dome province of southern Mississippi, wherein numerous shallow piercement type salt domes are present, fairly convincing seismograph evidence has been obtained as to the depth of the mother salt bed. Reflection records shot and recorded directly over several domes show a number of shallow reflections from the sedimentary beds above the dome, followed by a long blank space at the end of which strong reflected events appear. It is assumed that the blank reflection-free space represents travel time in the uniform salt mass, and that the prominent reflection immediately following is from the source bed of salt. Calculations show the base of salt to be at subsea depths of 23,000 to 25,000 ft.



H. B. PEACOCK
President, S.E.G.

●

C. A. HEILAND (Colorado School of Mines)

A Rapid Method for Measuring the Profile Components of Horizontal and Vertical Gravity Gradients

The trend in gravity exploration in the past years indicates the rather remarkable fact that a method of low resolving power (the gravity meter) has replaced one of higher resolving power (the torsion balance). This is entirely due to the superior speed of the former and suggests an instrument and procedure in which observation time is reduced by (1) reduction in number of quantities measured; (2) use of a reference direction near that of the maximum effect; (3) elimination of the torsionless position as unknown; (4) reduction in period, with compensating increase in optical sensitivity; (5) stabilization of thermal conditions. These objectives are attained by (1) measuring the profile components of gradients and curvature values, preferably at right angles to the assumed strike; whereby, for an ideal two-dimensional feature, also the vertical gravity gradient is obtained, and the vertical and horizontal gravity components may be calculated by integration; (2) by holding the torsionless position constant with temperature control; (3) by decreasing the period and observation time to 3-4 minutes, and (4) by using a beam arrangement which will give the gradient in only one azimuth, and the profile gradient of the horizontal gravity component in a second azimuth if desired. Latitude and terrain corrections are also somewhat simplified by the proposed procedure.

●

E. V. McCOLLUM (Mott-Smith Corp.)

Gravity Expression of the Hatchetigbee Anticline

Gravity data are presented showing a local minimum of gravity over the Hatchetigbee anticline leading to the conclusion that associated with this feature there is probably a very substantial thickening in the salt section.

●

J. A. GILLIN, LORENZ SHOCK, and E. D. ALCOCK (National Geophysical Co.)

An Application of Seismic Surveying to the Location of Bauxite in Arkansas

The exploration for bauxite has been greatly stimulated by the increased demand for aluminum. The geology of the formation of bauxite in Arkansas is closely related to the Syenite exposures on the old land surface at the end of Midway time. A refraction seismic survey mapped the attitude of the high velocity formations identified as Syenite or Paleozoic rocks. By combining this map with a map of the Midway from scattered core holes, a map of the old land surface at the end of Midway time was obtained. By interpreting this map, future explorations by core drills can be guided to favorable locations.

S.E.P.M. Holds Symposium on Changes in Recent Sediments

AFTER meeting with the other societies during the first 2 days of the meetings, the Society of Economic Paleontologists and Mineralogists will hold a technical session tomorrow. During the morning, a symposium will be presented dealing with the alteration of sediments after deposition. These changes, which are both physico-chemical and organic are of considerable importance in the formation of reservoirs as well as in the alteration of organic matter deposited with the sediments. This alteration may form source material for oil in some cases or may result in the removal of any possible source material in others. As the abstracts of the different papers presented below indicate, the symposium does not go into the question of the origin of oil, but deals entirely with rocks which may form reservoirs or source beds.

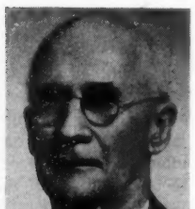
The afternoon session will deal mainly with the description of fauna found at different localities and with research and teaching methods.

●

W. H. TWENHOFEL (University of Wisconsin, Madison, Wis.)

The Rate of Deposition of Sediments: A Major Factor Connected With Alteration of Sediments After Deposition

Rates of deposition of marine sediments are shown to be highly variable. Slow rates of deposition permit long contact of the sediments with sea water and with bottom dwelling organisms. These organisms rather thoroughly macerate the slowly deposited sediments in their search for contained nutrient matter and pass them through their digestive systems and more or less completely destroy all shells and tests. The more abundant the organisms on bottoms of slow deposition, the less are the possibilities of the sediments containing other than fragments of shells. Slow deposition also leads to the formation of certain minerals of which glauconite is an example. Rapid deposition, on the other hand, swiftly removes sediments from contact with the sea water and the destructive work of bottom dwelling organisms. These sediments contain little excremental matter and they may contain many perfect shells and most of any organic matter deposited with them.



●

W. C. KRUMBEIN (University of Chicago, Chicago, Ill.)

Physical and Chemical Changes in Sediments After Deposition

Changes occur in sediments between the time of deposition and final lithification, under conditions of temperature and pressure associated with near-surface conditions in the lithosphere. Outstanding among changes in sediments after deposition are those due to compaction, to solution, to cementation, and to the development of authigenic minerals. The effect of both the chemical and physical processes is to introduce changes in the fundamental characteristics of clastic particles (size, shape, roundness, etc.) as well as in such mass properties as porosity, permeability, color, etc. These changes are most pronounced among fine-grained sediments. Nonclastics are affected more markedly than clastics, but the changes are often less readily defined. Structure as well as texture may be affected. The problem of reconstructing original conditions of sedimentation among lithified sediments in the light of these changes is discussed.

●

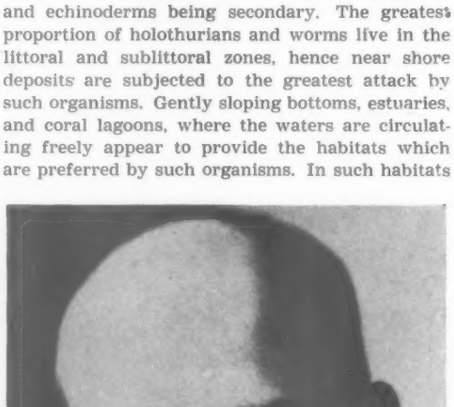
E. C. DAPPLES (Northwestern University, Chicago, Ill.)

The Effect of Macro-organisms Upon Sediments

Macro-organisms which may directly affect sediments after their deposition are limited to benthonic forms which burrow for shelter, or in search of food; and those which ingest sediments for the contained organic material. Such changes which are produced in sediments by such organisms are: destruction of bedding, destruction of gradation of grain size, trituration and solution of rock masses and fragments, formation of tubes and burrows, addition of fecal debris, initiation of cementation, bleaching or coloration, and destruction of organic material.

Since the degree of such alteration is necessarily directed proportional to the number of organisms living on the bottom, the greatest changes must occur where the optimum dwelling conditions exist; hence, not in regions of stagnant water, nor where sedimentation is rapid. Organisms which have the greatest effect upon sediments are holothurians and worms, rock borers and echinoderms being secondary. The greatest proportion of holothurians and worms live in the littoral and sublittoral zones, hence near shore deposits are subjected to the greatest attack by such organisms. Gently sloping bottoms, estuaries, and coral lagoons, where the waters are circulating freely appear to provide the habitats which are preferred by such organisms. In such habitats most of the macro-organisms prefer to live on sediments whose grain size varies from medium sand to silt dimensions, and also where a sandy mud is present. Hard clay, or soft clay and mud bottoms do not appear to provide desirable conditions for organisms which ingest sediments. Sand which is abundant on the floor of many coral lagoons appears to be a concentrate of coarse and medium sand, the finer material being triturated and carried out by currents, or dissolved in the bodies of organisms.

Fecal pellets so abundantly present in localities inhabited by holothurians, worms and echinoids appear to be preserved in sediments in the deeper neritic waters, and destroyed in the littoral. In deep waters such material results in phosphatic or glauconitic nodules.



HENRY V. HOWE
President S.E.P.M.

●

CLAUDE E. ZOBELL (University of California, La Jolla, Calif.)

Bacterial Activity and the Transformation of Marine Sedimentary Materials

Significant numbers of bacteria are found in recent marine sediments wherever critical tests have been made for their presence. The total number of bacteria as well as the number of different kinds of bacteria is greatest at the surface of the mud where there are often many millions of bacteria per gram. Both numbers and kinds (species) of bacteria decrease with the depth of the mud cores although several thousand living bacteria per gram of mud representing over a dozen species have been found at the bottom of mud cores exceeding 15 ft. in length.

Bacteria have been isolated from deep sea bottom deposits which attack most kinds of organic matter including highly refractory compounds such as cellulose, chitin, lignin, spongin, agar and waxes. Most types of protein are attacked with the liberation of ammonia or hydrogen sulfide. Fats and lipins are hydrolyzed by certain marine bacteria with the formation of fatty acids. *Vibrio desulfuricans* which reduces sulfate to hydrogen sulfide is quite widely distributed in sedimentary materials and the decreasing concentration of sulfate with depth suggests that it is active *in situ*.

Changes in the organic content, oxidation-reduction potential and hydrogen-ion concentration as well as changes in the amount and state of sulfur compounds indicate that bacteria may play an important role in the diagenesis of sedimentary materials. By decreasing or increasing the hydrogen-ion concentration bacterial activities may tend to precipitate or to dissolve calcium carbonate. Bacteria are present in marine bottom deposits capable of doing either, the direction and magnitude of the change being largely a matter of the organic, sulfate and nitrate content. By their effect on the oxidation-reduction potential of sedimentary materials bacteria influence the state of oxidation or reduction of such constituents as iron, manganese and other substances which may be reversibly oxidized or reduced.

Although it is still indeterminate if bacterial activities play a role in the genesis of petroleum, it has been established that they convert organic matter such as marine sapropel into substances which are more petroleum-like by reducing the oxygen, nitrogen and phosphorous content. Moreover, the low Eh (reducing conditions) which bacteria create in certain environments are theoretically conducive to formation and accumulation of hydrocarbons. Methane-producing bacteria are widely distributed in sedimentary materials but bacteria which produce other hydrocarbons (with the possible exception of complex pigments) have not been demonstrated. On the other hand it is possible that certain bacteria which are known to oxidize hydrocarbons under laboratory conditions may be active on the sea floor where

they could prevent the accumulation of hydrocarbons in detectable quantities.

WILLARD D. PYE (University of Chicago, Chicago, Ill.)

Rapid Methods of Making Sedimentological Studies of Sands, Especially as Applied to Cores

For some time it has been felt in the petroleum industry that although sedimentological methods might yield data of great interest, yet the procedures are too long and tedious for companies to employ except in cases of exceptional importance. The writer has been engaged in investigating various short-cuts in sedimentological research and comparing them with the longer and more exacting routine methods which form the standard procedures. The described methods all yield results comparable in accuracy to the standard procedures. As a result, it has been found possible to make a complete study of the physical properties of a sand, including size, sorting, shape, roundness, surface texture, cementation, mineralogy, mineral inclusions, and in some cases sources of the sand, all within approximately an hour from the time examination is started.

Briefly the method consists of taking a fresh surface of the core and with a stiff wire brush securing a representative sample consisting of some 500 grains of that part of the core it is desired to analyze. The sample is then given any necessary treatments, such as with acid or washing, in a depression in a microscope slide. The final step is to wash in acetone and mount in a glycerin-water solution either on the same slide or a new one. These grains are then magnified to a convenient size, projected on a flat surface such as a white table top, and with a millimeter scale, the maximum and minimum diameters of 50 of the projected images are measured directly from their outlines. From this data the size corresponding to sieving grade sizes is given by the short diameter, and the shape is given by the square root of the ratio of the short and long diameter. Mathematically it can be proved that for any elliptical or circular body this ratio will give a shape value identical with that given by Wadell's projection method. As outlines depart from this shape, errors increase. Roundness is estimated from prepared roundness charts. Curves and charts have been prepared to aid in calculation of means and sorting, calculation of shape, and conversion of numerical frequency to weight frequency size data so as to facilitate comparison with sieving methods.

A second fraction of the sand is mounted under a polarizing microscope in a selected index oil and the grains studied as to roundness, cycles of erosion, periods of secondary enlargement, alterations, mineralogy, surface textures, inclusions, and any other pertinent features.

For pore studied and grain relationships thin sections were used, although much data can be secured by simply using polished sections, and vertical or inclined illumination. To impregnate cores they were simply roughly ground to a smooth surface and heated for about 2 minutes in the open in some stained, precooked balsam. When cool, polishing was done by using rotating emery-paper laps of increasing degrees of fineness, care being taken not to overheat the specimen. Final polishing was done on a wet lap using green chromic oxide on a felt surface.

In heavy mineral separations either the use of a water pump, or simply the use of a piece of white cloth stretched across the top of the funnel instead of filter paper, greatly speeded up filtration.

It is felt that by using these methods, the difficulty of time has largely been reduced and sedimentological studies can be made which will be very advantageous in solving certain problems in regard to origin, location of new pools, and data which would aid in development and securing greater initial and secondary recovery.

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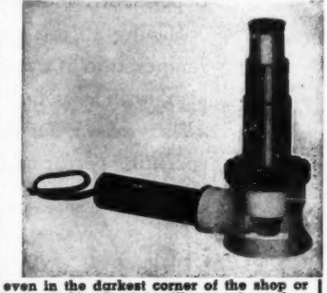

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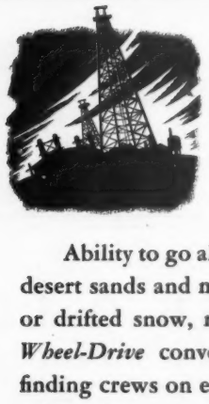

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ENGINEERING *and Operating* SECTION

▼

Gas-Cycling Increases Recovery

By NEIL WILLIAMS

Gas cyling has been undertaken by owners of combination oil and gas wells in the Otis field, in Rush and Barton counties, Kansas, as a means for attaining maximum oil recovery before reservoir pressures in the field are depleted by gas withdrawals for pipe-line outlets. Production allowables have been predetermined covering a period of 9 years, 1 year under the estimated economic life of the field's gas resources. The program calls for the return to the producing horizon of all gas not taken by pipe-line outlets.

A CONSERVATION program designed to enable owners of combination oil and gas wells to produce all their potentially recoverable oil before gas withdrawals from the reservoir deplete pressures below productive limits is being carried out in the Otis field, Rush and Barton counties, Kansas. Under the allowable schedule which has been worked out on a long-range basis, the remaining recoverable oil in place, calculated at 1,545,420 bbl. as of May 1, 1941, is to be produced over a period of 9 years, 1 year less than the estimated gas-producing life of the field.

The program is unique in that a limited period has been prescribed for the recovery of the oil. It was authorized by the state Corporation Commission upon instigation of owners of combination wells and based upon an engineering study of field conditions which revealed that unless the oil could be obtained within this period much would be left in the reservoir never to be recovered, and thus create a material waste. The allowable order at the time was regarded as one of the most comprehensive ever issued and was looked upon as setting a precedent governing the production of combination wells in other predominately gas-producing fields.

Provisions of the program prohibit the venting of any gas to the atmosphere if the increased current oil allowables granted by the order are to be sustained. In this, owners of combination wells are required to return to the producing reservoir all gas produced by such wells except any gas that might be taken by pipe-line outlets. This has called for gas-cycling projects, three of which have been undertaken in the field.

Largest of these projects is one recently placed in operation by Morgan, Flynn & Cobb, of Tulsa, owners of the major portion of the oil-producing area of the field. In this project, facilities have been provided for cycling more than 12,000,000 cu. ft. of gas daily, and include a gasoline plant for stripping the cycled gas, as well as equipment for recovery of propanes and butanes. Two other small cycling plants, one with a single compressor and the other with two compressors, are operated by Kenwood Oil Co. on small adjoining leases.

Extending over an area of between 16,000 and 17,000 acres, of which only about 700 acres at the base of the structure along the south side is underlain with oil, the field is classed primarily as a gas-producing pool, and has been regulated as such. Because of this the production of oil is being governed by the rate at which gas is produced. In the absence of a water drive, which has been definitely determined, gas is the sole source of reservoir energy, thus making the recovery of the oil before the depletion of the gas reserves a major consideration.

In the engineering report upon which the allowable order governing the present long-range production program is formulated, it was estimated that on May 1, 1941, remaining gas reserves in the reservoir totaled 108,700,000,000 cu. ft. It was shown that 99,200,000,000 cu. ft. of gas had previously been withdrawn from the reservoir, including 64,000,000,000 cu. ft. for pipe-line sales, 6,100,000,000 cu. ft. used in operation of gas wells, and 29,100,000,000 cu. ft. vented by combination wells.

Of the remaining 108,700,000,000 cu. ft. of gas it was calculated that 93,700,000,000 cu. ft. should be recovered if no further venting of gas from combination wells occurred. This calculation assumed an abandonment pressure of 50 lb. at the wellhead. Estimated original bottom-hole pressure of the reservoir was 1,178 lb. In the withdrawal of 99,200,000,000 cu. ft. of gas, along with 1,410,868 bbl. of oil, as reported in the engineering survey, the bottom-hole pressure, as of May 1, 1941, had dropped to 660 lb. Assuming a continuation of the

General view of Morgan, Flynn & Cobb gas-cycling and gasoline plant in Otis field, Rush and Barton counties, Kansas. Small columns in background at right of compressor plant (left) comprise the gasoline-treating and butane-recovery units. Building behind absorber houses the gasoline plant, while in front is the cooling tower for interstage gas and jacket-water cooling sections. Steam-generating plant and office are at right

present rate of gas production it was estimated that the recoverable gas would be depleted and well-abandonment pressure reached in approximately 10 years, the period on which the present production program is based.

The report estimated that the reservoir originally contained 5,912,500 bbl. of stock-tank oil, of which 50 per cent, or 2,956,250 bbl., should be recovered. Of this 1,410,868 bbl. had been produced up to the time of the report, leaving 1,545,420 bbl. to be recovered, providing gas pressures do not drop below the well-abandonment level before all this oil is produced. While the field-abandonment stage is not expected to be reached before 10 years, the specified 9-year allowable period provides leeway to assure the recovery of the oil. The allowable schedule calls for a production of 27,200 bbl. monthly the first year, 24,000 bbl. monthly the second year, 20,800 bbl. monthly the third year, 17,600 bbl. monthly the fourth year, 14,400 bbl. monthly the fifth year, 11,200 bbl. monthly the sixth year, 8,000 bbl. monthly the seventh year, and 7,200 bbl. monthly the eighth and ninth years.

Allowables Drop With Field Age

A flat monthly allowable of 14,400 bbl. over the 9-year period would total to the amount of oil to be produced but, since the permeability of the formation with respect to oil will decrease progressively as the reservoir pressure declines, due in part to the withdrawal of gas from solution, the allowable was made to conform as nearly as possible to the decline of the pool's productive ability. The allowables for the eighth and ninth years conform to the statutory minimum of 15 bbl. per well, assuming there will be as many as 16 combination wells in operation throughout those 2 years.

In return of the gas produced by combination wells to the producing horizon, and prohibition of venting of gas, it is estimated that the volume of gas to be recovered will be 43,100,000,000 cu. ft. greater than otherwise would be the case, an important factor in prolonging the life of the field and delaying the well-abandonment point. Also, on the basis of the present market price of 4 cents per 1,000 cu. ft. for gas, in this field, the venting of this volume of gas would constitute a greater economic waste than the loss in the reservoir of the oil.

The producing horizon is the Reagan sand, lying at a depth of 3,500-50 ft. On the Morgan, Flynn & Cobb leases there are 19 combination wells with bottom-hole pressures of between 500 and 600 lb. At present from 8,000,000 to 10,000,000 cu. ft. of gas is being produced from the wells daily to make the oil allowables.

Oil production is recovered in conventional field-separator operation, with the separator vent gas being gathered and delivered to the centrally located gasoline absorption plant, where it is stripped of any gasoline content, and thence to compressors for return to the producing sand. The gasoline plant is operated at absorption pressure of 100 lb., at which pressure the compressors take suction, boosting the residue gas to approximately 700 lb. The single gas-input well is located upstructure in the gas zone and about 1,500 ft. from the plant. The allowable order requires that the input well be at least a mile from the nearest oil well.

Plant Has Five Compressors

The cycling plant contains five 230-hp., two-stage gas-engine compressors, each with 16-in. by 20-in. engine cylinders and 17-in. by 20-in. compression cylinders. These units originally were rated at 165-hp. each at 180 r.p.m., but were stepped up in horsepower by the installation of fuel economizers. The low-pressure cylinders of the compressors take suction from a 12-in. header which delivers the 100-lb. gas from the absorber residue gas scrubber. These cylinders discharge at 295 lb. pressure to an 8-in. header to the interstage gas coolers. The high-pressure cylinders, taking suction from a 10-in. header, boost the 290-295-lb. gas to 700 lb., discharging to a 6-in. header to the meter run, from where there is a 4¾-in. line to the gas-input well.

Interstage gas cooling is by means of bent-tube sections in the base of an atmospheric cooling tower and through which the 295-lb. gas from the low-pressure cylinders is passed. Cold well water, circulated by an electric-motor-driven centrifugal pump, is sprayed over the cooling sections.

Engine-jacket water bent-tube cooling sections are located in the base of the same tower. In contrast to many jacket-water cooling systems, the jacket water in this installation flows by gravity to a water accumulation sump. From there it then is circulated by motor-driven centrifugal pumps through the bent-tube sections and back to the cylinders. There are eight bent-tube sections for this purpose. There is an 8-in. water outlet line from the engine jackets to the water sump, while a 6-in. header returns the cooled water from the bent-tube sections to the jackets.

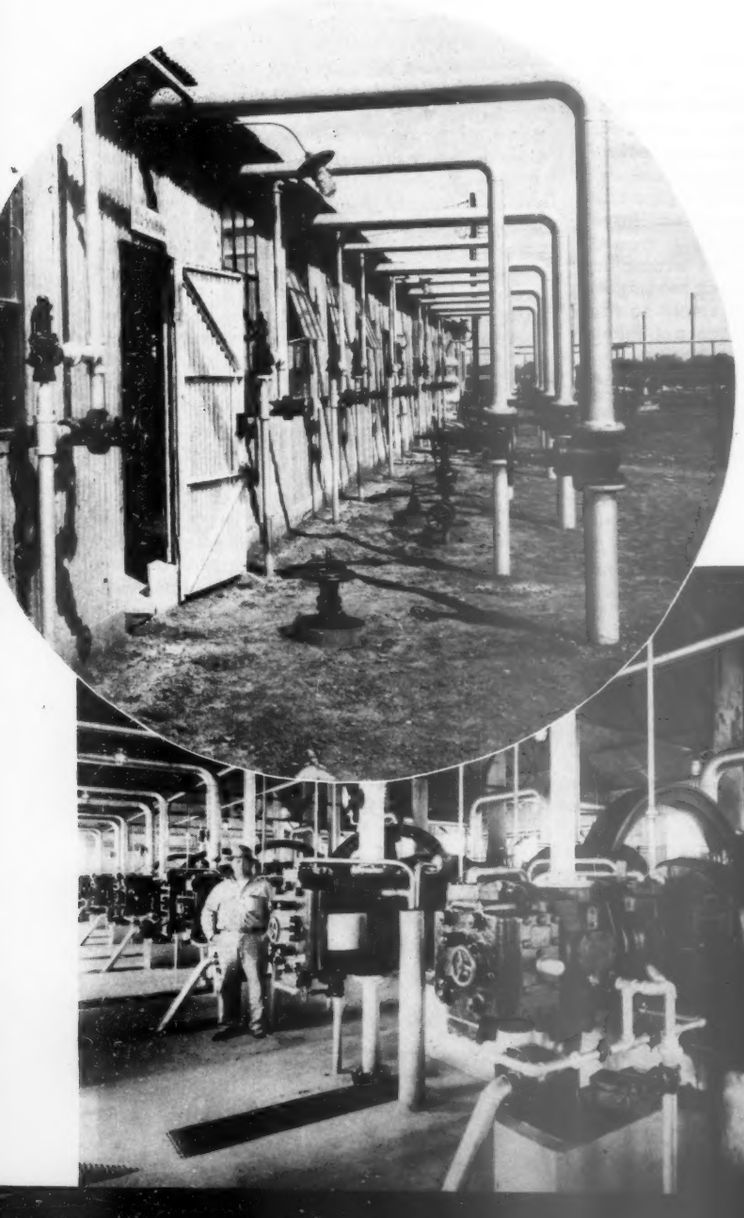
Provision has been made to divert, if desired, some of the 700-lb. gas from the high-pressure cylinder discharge header through a 2-in. line to another bent-tube section in the cooling tower for delivery to one of the field's several pipe-line outlets, the Northern Natural Gas Co. Gas returned to the producing horizon is not cooled.

Gas from the field enters the plant through an 8-in. intake line fed by 6-in. main field lines serving different sections of the lease. The plant is located on a 330 ft. by 330-ft. site near the center of the lease. The 8-in. intake line extends across the site to points outside the plant on opposite sides and is fed from both ends, two 6-in. field lines converging at each end. Outlet for the intake line is near the midway point, where the inlet gas scrubber is located and to which the gas from both directions is first passed for trapping of any moisture content.

A pressure of 100 lb. is held on this scrubber as well as on the absorber. The absorber is 6 ft. in diameter and 38 ft. high. Lean oil is circulated through a 2-in. line to the top of the absorber at a rate of approximately 70 gal. per minute by a 25-hp. 7-in. by 4¾-in. by 10-in. reciprocating, stroke pump at a temperature of 68° F. The stripped gas is passed through a residue scrubber for trapping of any oil mist that might be carried over and thence through an 8-in. line to the 12-in. compressor suction header.

The distillation and fractionation unit is of a Southewstern portable type and operation is conventional. The still is operated at a pressure of 40 lb. Bottom temperature is maintained at 326° F. Top temperature is controlled for an endpoint of 228° F. The dephlegmator contains a separate top control section and is equipped with auto-

(Continued on Page 66)



Left: Compressor manifold installation

Below: Five 230-hp. two-stage gas-engine compressors comprise the gas-cycling plant, boosting the pressure of the 100-lb. absorber residue gas to 295 lb. in the low-pressure cylinders, and from 295 to 700 lb. in the high-pressure cylinders

Geologic Distribution of Oil In the Illinois Basin

By B. F. HAKE
Gulf Refining Co., Indianapolis, Ind.

Oil produced from fields developed in the Illinois basin since January 1, 1937, comes from about 20 formations. Because many wells produce simultaneously from two or more of these, the producing horizons are grouped into nine zones. An estimate is made of the quantity of oil produced to January 1, 1942, from each of these zones.

This article is a slightly abbreviated version of a paper delivered before the spring meeting of the Eastern district, Division of Production, American Petroleum Institute, at Pittsburgh, Pa., April 9-10, 1942.

ALTHOUGH several well-located wells have penetrated sands below the Trenton, no oil is produced from them. Trenton oil has been found in two fields, Salem and Centralia. Trenton production from Centralia is unimportant and oil recovered from the Trenton in Salem amounts to somewhat less than 1,000,000 bbl. The porosity in both of these fields is tight and an initial capacity of 250 bbl. per day is above average. No oil has been discovered in Silurian rocks in the new fields, although porous limestones are known to occur in the Silurian section.

Devonian Production

Among new fields of the basin there are 10 discoveries of Devonian oil and 8 of these have resulted in important production. The oil occurs chiefly in dolomitic porosity and the initial capacities of the wells range up to more than 12,000 bbl. per day. A fairly effective natural water drive is believed to be present in most of the Devonian fields, and the productive lives of the wells will probably be rather short, although individual recoveries are substantial amounts.

Lower Mississippian Production

Rocks here included in the lower Mississippian productive zone are the Salem, St. Louis, and Ste. Genevieve formations. These rocks are responsible for the existence of a very large number of the new fields and have yielded about 28 per cent of the oil produced from those fields.

The Salem limestone contains some porosity in almost all parts of the basin but is not an important oil producer except in the Salem field. The St. Louis limestone, which overlies the Salem, has yielded minor amounts of oil in several localities, usually where the overlying limestones lack important porosity. St. Louis wells are small and the formation is not the main productive horizon in any important field.

The Ste. Genevieve formation includes in its lower part beds of oolitic limestone with which are associated both dense limestone and dolomites. These oolitic beds are called the "McClosky" and among the new fields McClosky discoveries are very numerous. Initial capacities of McClosky wells run from a few gallons to over 9,000 bbl. per day. The oil production from these wells declines rapidly and usually little or no water is produced. Above the McClosky zone is a highly variable series of sands and sandy oolitic limestones called the Rosiclare member. It is a relatively unimportant oil producer. The uppermost member of the Ste. Genevieve formation is the lower O'Hara or Levias limestone. In some localities it is oolitic and yields commercial production, though it is far less important than the McClosky.

Lower Chester Production

Above the Ste. Genevieve limestone and below the Golconda formation there is a thickness of about 300 ft. of sands and shales with thin and nonpersistent limes. The series thus defined constitutes the most important productive zone in the new fields and has yielded about 55 per cent of the oil produced from them. It includes the Aux Vases, Benoist, Paint Creek and Cypress sands. Correlations made between sands of this zone and distinctions made between them are often subject to question. In many of the new fields, including the two largest ones (Salem and Louden), two or more of these sands are produced together through the same wells so that the productivity of single sands cannot be ascertained. The entire group of lower Chester sands is therefore treated here as one unit.

The lowest productive member of this group is called the Aux Vases sandstone. Recently it was discovered that important production could be obtained from it where there was no impressive evidence of oil either in the drill cuttings or in the electric logs. Two wells which had been abandoned as dry holes were subsequently recompleted in the Aux Vases with initial capacities of 1,000 bbl. and 400 bbl. per day. In both distribution and texture the Aux Vases is highly erratic and unpredictable, but its apparent importance as an oil producer is steadily increasing. The Aux Vases and Benoist sands are the Chester oil producers in the Salem pool. In Louden the Benoist, Paint Creek and Cypress are productive. Both Cypress and Paint Creek yield oil in many fields. Initial capacities of these sand wells sometimes exceed 1,000 bbl. per day and oil recovery is often attended by the production of considerable water.

Hardinsburg Production

The Hardinsburg is a thick sandstone locally, but is very erratically distributed. Among the new fields it produces oil in only four places and

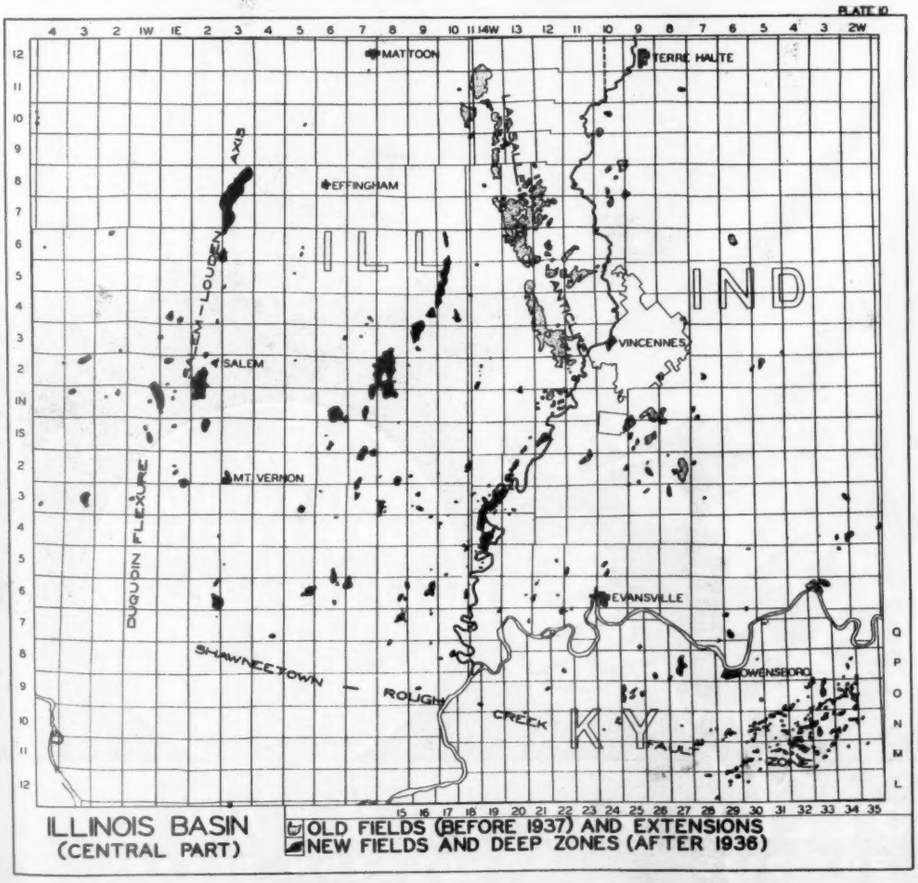


Fig. 1—Old and new fields in the Illinois basin

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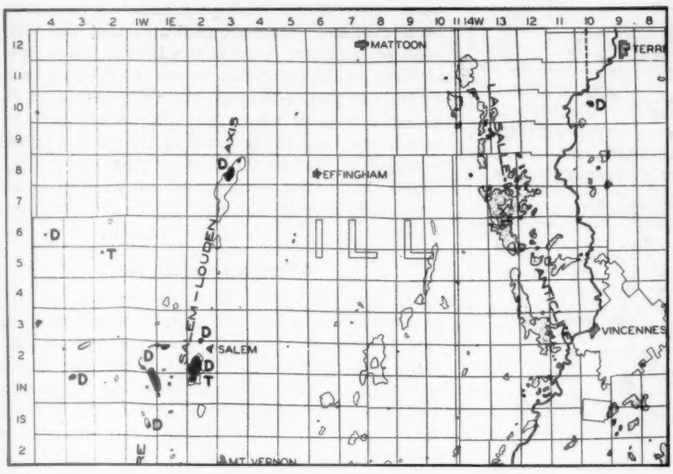


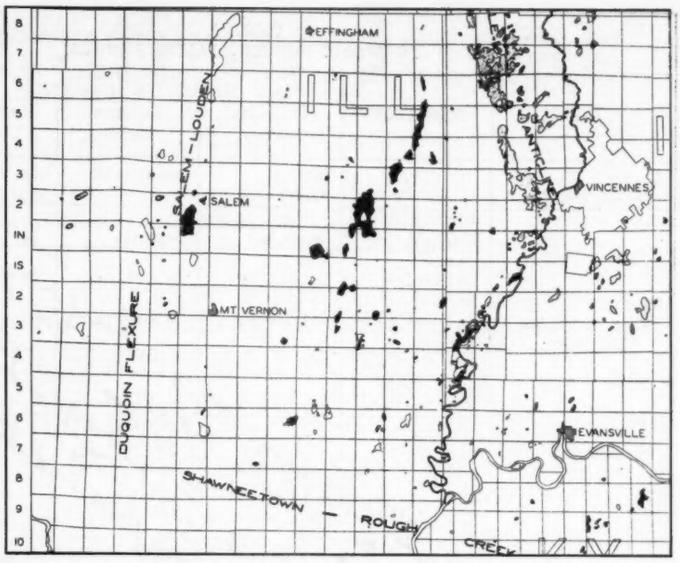


Fig. 2 (above)—Trenton (T) and Devonian (D). Fig. 3 (right)—Lower Mississippian Figs. 2 to 5 show distribution of new fields producing from different pays.

is an important producer in only one field, the Iron pool. Less than one-half of 1 per cent of the total oil produced in the new fields has been derived from it.

Tar Springs Production

The Tar Springs formation is a widespread series of sandstones and shales. Its upper portion consists of lenticular sandstones interbedded with shale; and a more persistent sand series is present in the lower part of the formation. The Tar Springs is the Jett sand of Kentucky, where it has produced oil in a large number of fields. Occurrences of Tar Springs oil are quite numerous among the new fields of the Illinois basin, especially in eastern Illinois and southwestern Indiana near the Wabash River. Most of the Tar Springs oil pools are of small extent; among the new fields of the Illinois basin there is but one large one. This is the Benton pool, which alone has produced about three-quarters of the oil which has been recovered from the Tar Springs sand. This formation is responsible for about 2½ per cent of the total recovery from the new fields. It has also been successfully used in a number of instances for brine disposal.

Waltersburg Production

The Waltersburg sandstone is extremely erratic in its distribution, sometimes diminishing in thickness from 65 ft. to nothing in a quarter of a mile. It is commercially productive in only about a dozen localities among the new fields, and of these only two or three are of prime importance. The formation receives considerable attention by prospectors because it is known to be capable of yielding wells with initial productions approaching 1,000 bbl. per day. The ultimate recovery from the better portions of Waltersburg pools will probably yield handsome profits. The Waltersburg sand has been responsible for a little less than 2 per cent of the present recovery from the new fields and the Storms pool has delivered over 40 per cent of all the Waltersburg oil produced.

Palestine Production

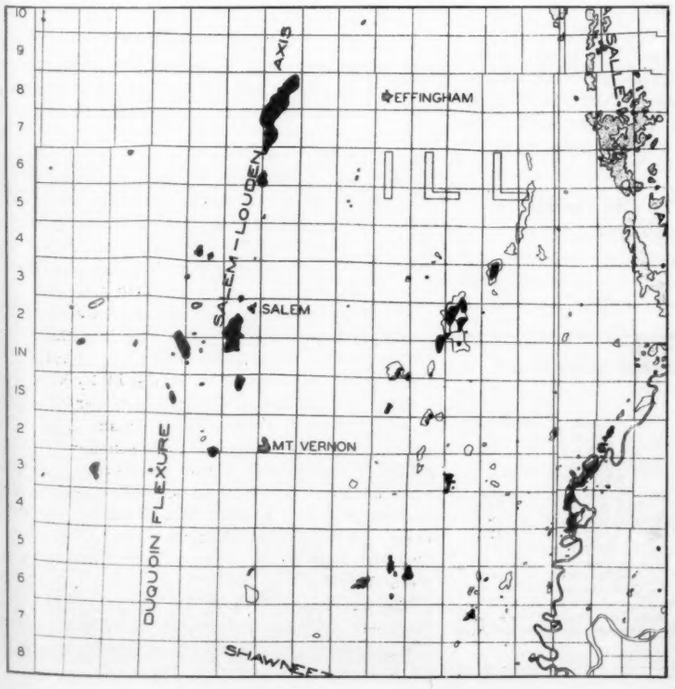
Lenticular sands in the Palestine and Degonia formations (which are here collectively referred to as Palestine) constitute the highest productive zone of the Chester series. This series is responsible for less than one-fifth of 1 per cent of the oil produced from the new fields of the basin. The most important production from the Palestine sand is on the Omaha dome where a few wells reported initial capacities between 300 and 400 bbl. per day and from which 370,000 bbl. of oil has been recovered to date.

Pennsylvanian Production

Although Pennsylvanian oil has been discovered in about a dozen places among the new fields of the basin, and some wells completed in its report initial capacities of 300 or 400 bbl. per day, recovery from these rocks is relatively unimportant. It appears to amount to about one-fifth of 1 per cent of the total. This contrasts sharply with the importance of the Pennsylvanian formations in the earlier developed fields of Illinois, Kentucky and Indiana. Most operators experienced in the old fields of Kentucky and Indiana regard the Pennsylvanian as a very important and profitable source of oil, and it has been estimated that in the old fields of Illinois, along the La Salle anticline, the Pennsylvanian was responsible for about 50 per cent of all the oil produced. The important oil-producing sands of the Pennsylvanian are either in the Pottsville or in the lower part of the rocks which overlie the Pottsville.

General Habits of Accumulation

All the oil-producing formations of the Illinois



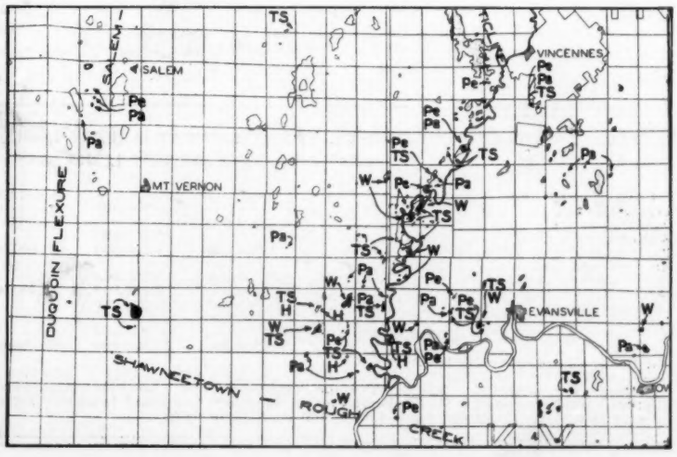


Fig. 4 (left)—New lower Chester pools. Fig. 5 (below)—Hardinsburg (H), Tar Springs (TS), Waltersburg (W), Palestine (Pa) and Pennsylvania (Pe)

TABLE 1
. GEOLOGIC SECTION, ILLINOIS BASIN

AGE	FORMATIONS	PRODUCTIVE FORMATIONS			PRODUCTIVE GROUPS THIS REPORT
		Illinois Terms	Indiana Terms	Kentucky Terms	
Lower Pennsylvanian		Petro Biehl	Mansfield	Big Water Sand	Pennsylvanian
Upper Mississippian (Chester)	Kinkaid				
	Degonia	Degonia	Degonia		Palestine
	Clore				
	Palestine	Palestine	Palestine	Chapman	
	Menard				
	Waltersburg	Waltersburg	Waltersburg	Fuqua	Waltersburg
	Vienna				
	Tar Springs	Tar Springs	Tar Springs	Jett	Tar Springs
	Glen Dean				
	Hardinsburg	Hardinsburg	Hardinsburg	Jones	Hardinsburg
	Golconda		Oakland City	Jackson	
	Cypress	Cypress	Cypress	Barlow	Lower Chester
	Paint Creek	Paint Creek	Bethel	Bethel	
		Benoist			
	Renault				
	Aux Vases	Aux Vases	Aux Vases	Cunningham	
Lower Mississippian	Lower O'Hara	Lower O'Hara	Lower O'Hara		Lower Mississippian
	Rosiclare	Rosiclare	Rosiclare		
	Fredonia	McClosky	McClosky	McClosky	
	St. Louis	St. Louis			
	Salem	Salem			
	Warsaw Osage Kinderhook Chattanooga				
Devonian	Limestone	Devonian	Devonian		Devonian
Silurian	Limestone				
Ordovician	Maquoketa				
	Kimmswick	Trenton	Trenton		Trenton
	Plattin Joachim St. Peter				

basin have one characteristic in common: porosity and permeability within each of them are extremely variable and erratic, both as to quality and distribution. The influences of these variations have tended to produce a large number of small oil fields in each productive zone. On well-developed anticlines and domes there has been a strong tendency toward the formation of commercial accumulations in the same area at several different depths. Because of these variations of the lithology within each formation, a perfect superposition of one oil body over another, under structural influences, was seldom attained, though the oil bodies at different levels are generally overlapping.

This composite effect of structure and stratigraphy is more marked on the eastern side of the basin than on the western. When such oil deposits are mapped without regard to formation from which the oil is obtained, the resulting picture displays extensive productive areas or irregular, sprawling forms such as characterize most of the published maps of the oil fields of the La Salle anticline and Wabash River districts.

On the western side of the basin, some of the productive sands are more uniform in their physical characters, and the structural influence has been more effective. There, large, prolific oil fields of symmetrical forms are found with their deeper productive areas vertically beneath the shallower ones. The Salem pool is the outstanding example of this type of oil occurrence. It is an elongated dome with nearly three hundred feet of closure. The oil bodies in the Chester rocks underlie about 8,500 acres. Beneath this field there are five major productive zones: Lower Chester, Ste. Genevieve, Salem, Devonian and Trenton. The development of these various levels of production has occasioned the completion of over 2,700 productive wells. The field far outranks any other in the Illinois basin in point of total recovery to date, having produced at the end of 1941 over 152,000,000 bbl. of oil.

Comparison With Old Fields

Uncertainties in the records of production from the older fields of the basin are so great and numerous that a thoroughly satisfactory comparison between those fields and the ones developed since 1936 is impossible. Such information as is available, however, indicates that the total recovery from all fields of the Illinois basin (specifically excluding fields on the Cincinnati arch in Indiana and Kentucky) during a period of 35 years is a little more than 900,000,000 bbl., of which the new fields have in the past 5 years produced about 43 per cent or just under 400,000,000 bbl. This tremendous acceleration is an interesting example of the effect of modern requirements and exploration methods.

Acknowledgements

For assistance with and information used in preparing this paper the author is indebted to many individuals, both in Gulf Refining Co. and other organizations. Special acknowledgment of courtesies is due to Carter Oil Co., Magnolia Petroleum Corp., Ohio Oil Co., Pure Oil Co., Shell Oil Co., Inc., and Texas Co. Published works have been drawn upon extensively. Without the data made available by W. T. Johnson this paper could not have been written. C. M. Lonsway drafted the plates, and E. H. Scobey and P. H. Dana contributed valuable suggestions.

TABLE 2—ESTIMATES OF TOTAL OIL RECOVERED AS OF JANUARY 1, 1942, ILLINOIS BASIN FIELDS, DEVELOPED SINCE JANUARY 1, 1937

Formation or zone—	Illinois	Indiana	Kentucky	Total	Per cent of grand total
Pennsylvanian	500,000	300,000	(*)	800,000	0.2
Palestine sand†	700,000	(*)	.....	700,000	0.2
Waltersburg sand	4,500,000	2,600,000	.....	7,100,000	1.8
Tar Springs sand	8,200,000	1,100,000	100,000	9,400,000	2.4
Hardinsburg sand	1,500,000	.....	.....	1,500,000	0.4
Lower Chester sand‡	209,500,000	5,700,000	.....	215,200,000	54.6
Lower Mississippian lime§	105,400,000	¶2,100,000	2,600,000	110,100,000	28.0
Devonian lime	48,000,000	500,000	.....	48,500,000	12.2
Trenton lime	900,000	.....	.....	900,000	0.2
Total	379,200,000	12,300,000	2,700,000	394,200,000	100.0
Old fields, all zones, entire basin‖	.....	.....	.....	518,000,000	

*Negligible quantity. †Includes Degonia sand production. ‡Includes Aux Vases, Benoist, Paint Creek and Cypress. §Includes Salem, St. Louis, McClosky, Rosiclare and lower O'Hara. ¶Includes unknown amount of Aux Vases production. ‖Estimate made from very incomplete data.

Gas-Cycling in Otis Field to Increase Oil Recovery

(Continued from Page 62)

matic drawoff at the bottom for removal of steam and condensation and water. Condensed gasoline vapors from the dephlegmator flow to a gasoline leg. A separate atmospheric-type cooling tower is provided for cooling condensing water.

Gas produced at Otis is unusually sour, and not only the gas going to market use but also the gasoline content recovered requires sweetening. For this, the plant includes a small treating unit, consisting of a 2½-ft. by 21-ft. caustic wash column, a 1⅓-ft. by 6-ft. caustic scrubber and a Perco-Phillips treater having a capacity of 10,000 gal. per day. The sour gasoline in the gasoline leg flows through the treating operation by plant-processing pressures, and thence to weathering (stabilizer feed) tanks. There are two of these tanks, each 6 ft. by 20 ft., with a capacity of 8,800 gal.

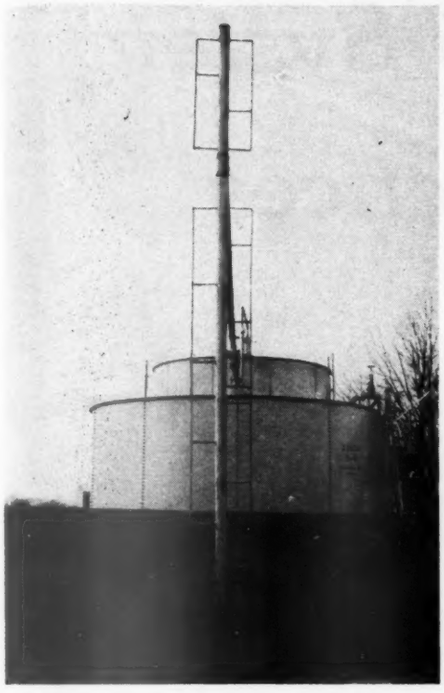
Reflux Accumulator

In normal operation, the gasoline accumulated in the weathering tanks is a 32 to 34-lb. product. The stabilizer now is being operated to cut this material down to an 18-lb. product, reclaiming the propane-butane. For this, stabilizer reboiler temperature is maintained at approximately 270° F. with top temperature at 230° F., controlled by reflux circulation. The column operating pressure if from 70 to 90 lb. The propane-butane reflux accumulator has a drawoff running propane-butane in excess of reflux requirements to storage.

Steam requirements are supplied by two oil-field type boilers, one being 125 hp. and the other 85 hp. Both are equipped with Copes regulators. Feed-water pumps are 7 in. by 3½ in. by 8 in. and 7 in. by 3¼ in. by 8 in. in size, one serving as a standby. Water drawoff and steam traps are placed on steam preheaters and reboilers and on all low places on steam lines for recovery and return of steam condensate to boiler feed water. Makeup water is treated in a Zeolite water-softener unit with the addition of some chemicals. The steam plant is housed in a 20-ft. by 40-ft. metal building.

Electric power is supplied by a 125-kva., 480-volt, 440 r.p.m., 60-cycle generator, driven by a 170-hp. gas engine. The unit is housed in a 32-ft. by 32-ft. metal building.

Operating Ideas



Ladder on Vent Riser

One Illinois operator has installed special ladders on the vent line from the tank battery. The ladders are made by welding sucker rods on both sides of the pipe supporting the vent and on the vent itself.

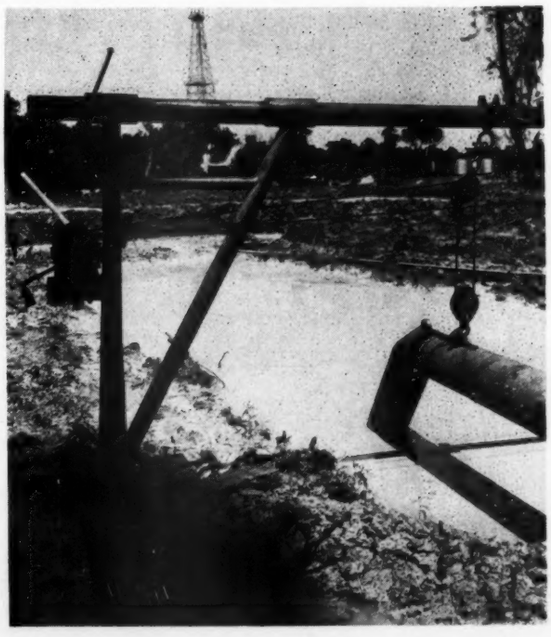
Spinning-Rope Spool

Located underneath the derrick floor in a convenient dry spot, this portable spinning-rope spool was provided by a crew of a drilling contractor operating in South Louisiana. The spool, a handy and neat-looking device for extra spinning rope, is constructed of 1-in. by 6-in. pine boards and can be knocked down easily and transported from one location to another. The loose end of the rope is run through a hole cut in the derrick floor above. A loosely tied knot keeps the end handy for measuring and cutting the rope into desired lengths.

Foot Rest on Brake Speeds Drilling

By welding a right-angled section of rod to the lower side of the brake lever, a driller on a South Texas rig provided a foot rest which enables him to vary the monotonous hand control of pressure by changing off to foot control. If the weight on the lever gives nearly the desired feed, the extra control can be obtained while seated by resting one foot on the loop. The driller also can use the loop to operate the brake by knee pressure when going in the hole, thus taking some of the strain from the driller's arm. The loop is a convenient place for attaching weights without cluttering the hand space on the brake handle while leaving the fork clear for sufficient weight to hold entire load.

Rigidity For Suction-Hose Support



Pump pulsations impose a severe strain on the supports for the lifting devices regulating the working depths of the suction hoses. Special bracing must be provided to prevent failure. To insure adequate bracing a Texas drilling contractor makes the end supports V-shaped with two bearings carefully aligned to support the transverse pipe. With this the extent of the support is greatly extended and the swaying suppressed. If the base of the support is made of a single piece of pipe, set at 90° to the suction supporting member, the entire unit can be supported on cribbing and allowed to pivot until even distribution of the load is obtained, permitting the pipe member to assume a slight sag without straining the foundation or base member. The suction line is raised or lowered by the hand-operated winch affixed to the leg of the support.

Plantation Pipe-Line System Adopts Efficient Practices

By PAUL REED

The line across southeastern states put in operation early this year is already serving a function which promises to be of increasing importance as facilities are enlarged for handling greater quantities of refined products in a manner which contributes effectively to relieve the East Coast shortage. This article deals briefly with practices adopted by company engineers, some of which are unusual, including those connected with pipe protection, laying of lines, electric-station equipment, automatic controls, and dispatching by teletype.

IN planning construction and operation of the longest national-defense line yet built, engineers of the Plantation system have applied the results of close study of the problems of refined-products pipe lines. Practices which they have adopted and improved represent advances in this underground transportation technique which provide for operation at high efficiency.

The significance and principal features of this line, during the early part of the construction period, have been described in The Oil and Gas Journal, October 30, 1941, Page 37, and December 11, 1941, Page 44. Construction of the line is approaching completion. All pipe called for by plans for the original project has been laid. With part of the required pumping equipment, the system is operating while the remainder is being installed. At this time the management of the company furnishes additional information regarding features of the project which is presented in this article.

Plantation Pipe Line Co. is owned by the Shell Union Oil Corp., Standard Oil Co. (Kentucky) and Standard Oil Co. (New Jersey), but is a common carrier operating under the jurisdiction of the Interstate Commerce Commission.

The line passes through Mississippi, Alabama, Georgia, South Carolina and North Carolina. A lateral spur reaches into Tennessee. The system is 1,261 miles long. The main line between Baton Rouge, La., and Greensboro, N. C., is 788 miles long. Lateral lines run to points in Alabama, Tennessee and Georgia. The Plantation system cost $20,000,000 and used 123,050 tons of pipe of 4-in., 8-in., 10-in., and 12-in. diameter. Product will be delivered from the line at 17 terminals constructed along the line by Standard (Kentucky), Standard of Louisiana, Shell and Standard of New Jersey.

The first actual construction work on the Plantation pipe line was the stringing of pipe along the right-of-way on August 14, 1941, less than 6 months before the main line was completed. The first welding started on August 19, 1941, and the first ditching was done on August 21, 1941. The work of clearing the right-of-way was started at Baton Rouge on July 28, 1941. A good construction record was made during the week of November 14, when 54.16 miles of 12-in. pipe and 47.17 miles of 10-in. pipe were welded.

Contractors used electric welding machines of 200 to 400 amperes rating and suitable electrodes. On the 12-in. line and 10-in. line the first bead was $\frac{3}{16}$-in., second bead ¼-in. and third bead $\frac{5}{16}$-in.

Corrosion survey was made for the entire 1,261 miles of pipe line, and based upon the results of this survey the pipe line was coated through those areas which indicated accelerated corrosion rates. The rates of corrosion vary in different soils and three classes of coatings were applied, depending upon whether the indicated rate was high or relatively low.

Broadest river crossing encountered by the Plantation pipe line was the Coosa River in Alabama, some 800 ft. wide. Here, as in many rivers crossed by the line, it was discovered that the ridged sand bottom did not result from the current but followed the contours of the close underlying granite. A ditch had to be blasted across the ridges so the pipe could lie below the river bottom. Pipe laid here, as in all river crossings, had a wall twice as thick as pipe laid elsewhere. Twelve-inch pipe, for instance, had a ½-in. wall. It was tested at 1,200-lb.-per-sq.-in. pressure with water before and after it was laid in the river bottom.

Testing

A swab was driven through the line with compressed air. This practice permitted the line to be cleaned in sections of various lengths from ½ mile to a maximum of 5 miles. After all sections had been welded together and the line backfilled, it was first tested in sections between blocking

(Left) Blasting was required in granite at stream beds. Pipe at crossings was protected by a covering of wooden slats

Photographs on this page courtesy U. S. Department of Interior

Right: Cold bending of 12-in. pipe on the steep slopes of mountainous country required special care to complete the operation without capsizing the tractors

gates and successive pumping stations by filling with air which was contaminated with an olfactory agent (calodorant) and the pressure was raised to 100 lb. per sq. in. The line was then walked by men and leaks could be detected by the odor of the escaping air. Even pin-hole leaks may be so detected, in spite of the backfill of 2 or 3 ft. of earth. The air test was followed by a hydrostatic test. Gasoline was pumped into the line from one station to the next and the pressure was built up to 1,000 lb. per sq. in.

In filling the line with gasoline, the fluid is preceded by a rubber plug. This serves two purposes: (1) to force the air out ahead of the gasoline, (2) to maintain uniform fluid flow, thereby eliminating air pockets in the line. Due to the precautions which were taken and the manner in which the line was filled with fluid, there was a very small amount of foreign material received at any station.

Stations are of modern architectural design, and include pump room, control room and tool room, as well as the manifold platform which is outside the pumping station proper. The pump room and the control room are separated by a glass partition and all other rooms are separated by solid partitions. The control room is elevated 3 ft. above the pump-room floor and from the electric-control desk a complete view of the pump room may be had. The entire operation of the pumping station may be started or halted by means of electric controls, operated from the control desk. This is an improved method of automatic control of pumping stations which results from design and engineering developments initiated by Plantation engineers and worked out in cooperation with engineering staffs of suppliers.

On the control desk each control valve in the station is indicated by a green light and a red light. Green means the valve is closed; red that the valve is open. All control valves are motor operated.

If the station has been shut down and is ready to resume operation, the operator pushes the start button for No. 1 pump on the control desk. The following operations ensue in sequence, without further control:

1. Suction valve on pump opens.
2. Vent valve on pump case opens to clear vapors out of pump.
3. Pump motor starts and comes up to speed.
4. Discharge valve on line leaving pump is opened, placing unit on the line. Vent valve closes simultaneously.

When start button for No. 2 pump is pushed, the same sequence is followed. When stop buttons are pushed, the reverse sequence is followed for both pumps. Any failure of the mechanism to operate is indicated immediately by the red and green lights on the desk.

Pumping equipment is somewhat unusual. This marks the first application of series pumping on a line of such large capacity, according to Plantation engineers. Two pumps, set up in series, are provided for each pumping station. Pumps are centrifugal type, especially designed for the line.

On the 12-in. section of the main line (432 miles), pumps are direct driven at 3,600 r.p.m. by explosionproof electric motors of 600 hp., the most powerful of this type ever built. Until now 500 hp. has been considered the top limit of this type of motor. All electric power is taken from public utility lines.

On the 10-in. section of the main line (351 miles), pumps are direct driven at 3,600 r.p.m. by explosionproof electric motors at 450 hp.

As all motors, switchgear and controls are explosionproof, no firewalls are required in the pumping stations. Castings for all motors on both the 12-in. and 10-in. line are identical, enabling Plantation engineers to rely on only two spare motors as standby for failures along the 788 miles of main line.

Pumping stations will be manned by one operator for each 8-hour shift. A station chief engineer will reside in a dwelling provided by Plantation on the pumping-station grounds.

All pumping stations are connected by direct teletype over a leased circuit and arrival of tenders at any point can be predicted within a few minutes. Aiding this prediction of arrival is the first large-scale use of the recording gravitometer which is installed on the line at each pumping station and terminal. This device constantly records the specific gravity of the product passing through the line and is accurate to within 0.002° by weight. Accurate and careful handling of the product is thus assured, and "heart" cuts can be taken from the line with no chance for error. Terminal slop tanks will be fed in accordance with indications of the gravitometer.

Water slugs will not be used to separate the various products, such as gasoline and kerosene, which will be pumped through the line. This will eliminate water haze in kerosene, a condition which requires treatment. It also will reduce contamination and slop.

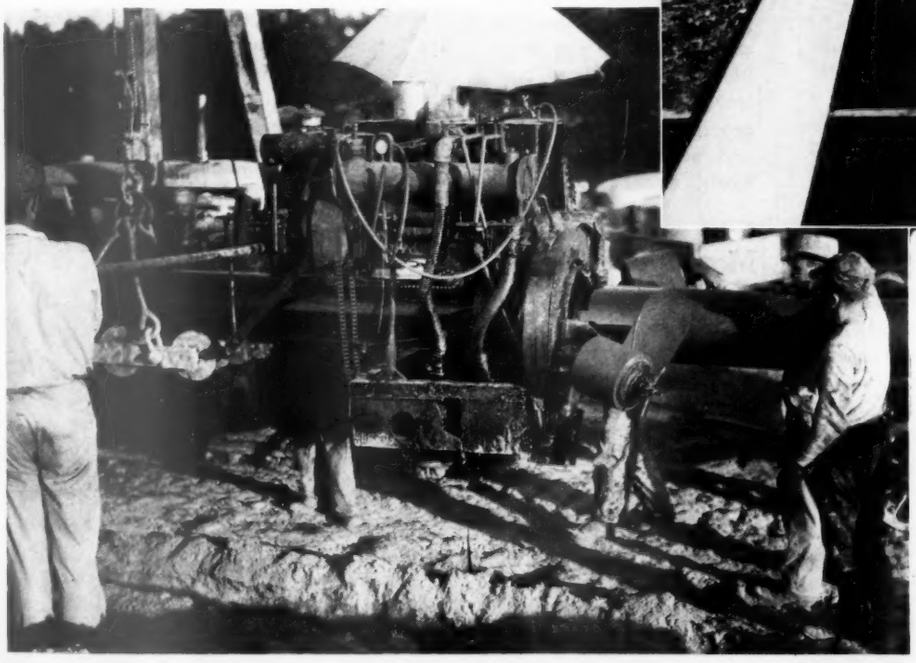
Product arrives at the pumping stations at a pressure of 50 lb. per sq. in. and leaves at 900 lb. per sq. in.

Shipments, called tenders, are scheduled 6 or more weeks in advance. The shipper delivers his tender at the head of the line at any time prior to the date of dispatch. It is held in storage until the day and hour set for shipping through the line. The consignee, awaiting delivery at a terminal along the line, is advised when the tender enters the line and what day he may expect it at the receiving terminal.

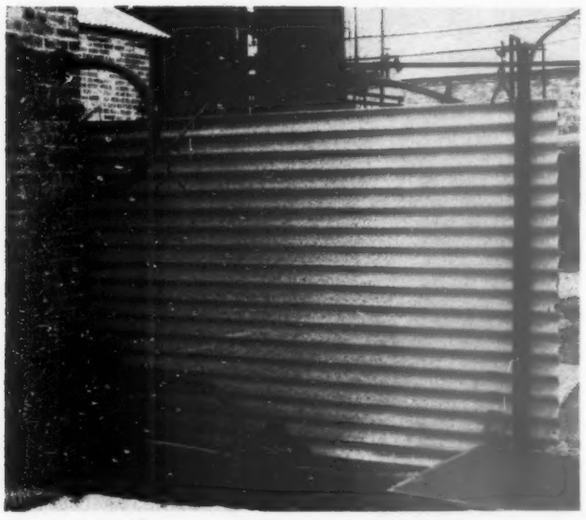
When a tender arrives at destination, it is delivered into tanks provided by the consignee. By means of the recording gravitometer, the specific gravity of the product is constantly recorded, and since a change in specific gravity indicates a change in product, the time or point at which a product may be switched from one tank to another can be readily determined. The volume delivered is determined by means of an accurately calibrated volume meter, and this meter is so compensated that the volume indicated by the meter is at a temperature of 60° F.

Right: Single as well as double coating with asphalt enamel and double wrapping with asphalt-impregnated asbestos was used at different sections of the line

Below: Extensive use was also made of a mastic coating applied by a special process

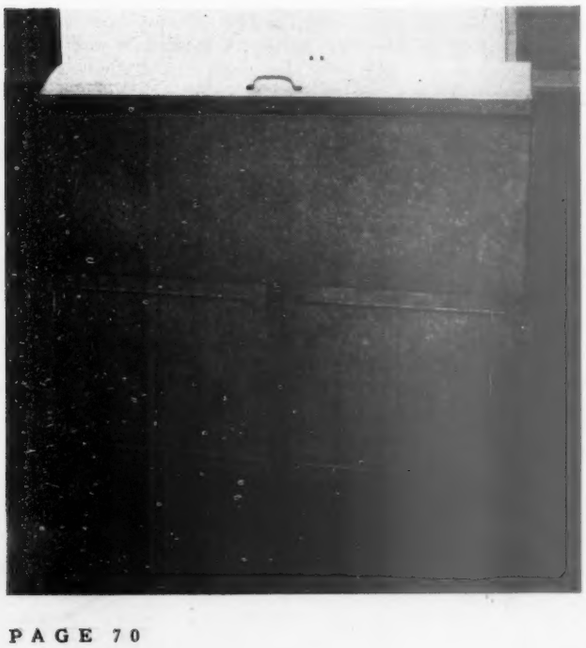


Refinery IDEAS ... that save $ $ $



Metal Cabinet For Storage of Oils

Every engine room is faced with keeping in stock several kinds of lubricants. These must be held in a place which is removed from dust, cold and which does not present a fire hazard. The storage of oils has been solved in one room through the installation of a galvanized sheet-metal cabinet. This cabinet has two shelves on which the oils may be stored. The lower section may be entered through doors which swing from the ends while the upper compartment is reached through the top.



Fire Wall Erected In Front of Control Valves

A serious break in the oil lines around the cracking unit can often render the shutting down of the equipment unduly hazardous. Here a fire wall consisting of a single sheet of fire-resisting material serves as a protection to the operator. The fire wall is supported by a steel frame and upon which pull lines have been mounted to enable the operator to close and open important valves at a distance by means of cables. In the picture covering has been temporarily removed to show the cellar or subway through which other lines pass and to indicate that at this location the operator has centralized control behind rather safe protection against fire and provided by a relatively small investment.

Converted Building

Needing space for the erection and operation of a battery of small percolating filters and having a five-compartment 35 by 15-ft. condenser box setting idle were the two conditions which caused one refiner to convert the setting into a building. A picture of the structure shows how the one end of the setting was bricked in and how the corrugated siding and roof were added on top to provide a two-story structure. One end of the old tank is visible as a part of the side wall.

Movable Hoist Assembled From Junk Pile

A hoist mounted on rollers and capable of lifting any machine part that might need to be repaired is an important item in a complete pump room. Here a hoist is shown which has been assembled from junk pipe. Short lengths of 3-in. pipe make up the frame and on front is mounted an ordinary windlass. The frame has been assembled from welded pieces of straight pipe under the assumption that the frame would thereby be stronger than if made from two bent arms. A feature of the frame is its ability to straddle the engine base and in that way be able to raise vertically any part of the engine.

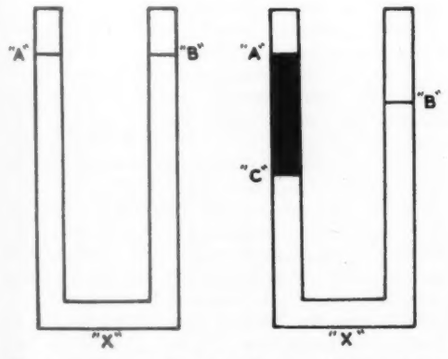
Design of Gun-Barrel Tanks for Oil-Water Separation

By FELIX B. GORDON
District Superintendent, Buffalo Oil Co.,
Mirando City, Tex.

IN order to properly design and install a gun-barrel system, some fundamental physics principles must be taken into consideration. Many gun barrels are installed and operated by the trial-and-error method and are working quite satisfactorily. The fundamentals of gun-barrel operation are here presented.

The primary purpose of the gun barrel is to separate water from oil, hence the gun barrel is sometimes referred to as a settling tank. The separation is effected by the difference in density and mutual insolubility of water and oil. In nearly all cases the process is continuous. Therefore the accumulating water and oil must be removed. The removal of the water takes place at the water drain, somewhere near the bottom of the tank. The oil passes out a fixed overflow connection. For proper operation, the water level in the gun barrel should remain constant. In practice the water level is controlled by an adjustable gooseneck overflow or siphon. The water overflow is sometimes called a grasshopper. The dimensions and settling of the grasshopper determines the water level in the gun barrel.

The continuous water-drain system is better understood if the gun barrel and grasshopper are first considered as a U-tube (Figs. 1 and 2). The



Figs. 1 and 2—U-tube principle on which gun-barrel tanks operate

gun barrel is the left leg AX of the tube AXB and the grasshopper is the right leg BX. Now if the U-tube is filled with water to the level at A, Fig. 2, the level at B will be the same. Thus for a single-phase fluid $(AX)D_w = (BX)D_w$, where D_w is the pressure exerted by 1 ft. of water and AX and BX are the heights of the fluid columns in feet. Now if the tube is filled with part water and part oil in the leg AX, the level at B will not be the same as the level at A, Fig. 2. The equation of that system is $(AC)D_o + (CX)D_w = (BX)D_w$, where D_o is the pressure exerted by 1 ft. of oil. The water level at B will not reach the oil level at A because of the greater specific gravity of water. In a gun barrel, Fig. 3, the oil level A on one side of the U is kept constant by the oil overflow and the water level at B is kept constant in one leg by the U overflowing at B. Once the overflowing U-tube system is put into operation, the water level at C will remain constant because of fixed oil and water levels at A and B, respectively, regardless of any variation of the percentages of oil and water entering the gun barrel.

Now consider a practical case. Assume a 10 by 25-ft. gun barrel whose oil overflow is 20 ft. from the bottom and the water drain is at the bottom. What should be the elevation of the grasshopper overflow which would maintain a 9-ft. water level in the gun barrel? The oil weighs 0.40 lb. per foot and the water 0.45 lb. per foot. Referring to

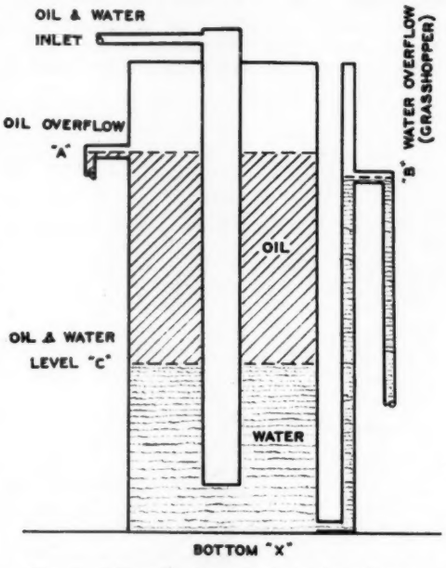


Fig. 3—Schematic diagram of gun-barrel tank

Fig. 3 and the two-phase formula $(AC)D_o + (CX)D_w = (BX)D_w$.

Substituting in the formula:

$$(11 \times 0.40) + (9 \times 0.45) = (BX)0.45$$
$$BX = 18.77$$

Thus the bottom of the overflow nipple of the grasshopper should be 18.77 ft. from the bottom of the water drain. Then the water level at C will remain nearly constant at 9 ft., provided both oil and water lines leading from the overflow are of sufficient size to handle all the fluid produced.

Any tendency for a rise of water level at C will result in a corresponding but not equal rise at B. The rise at B will cause more water to overflow thus counteracting a rise at C. The relationship between the rise at C and B can readily be found by differentiating the two-phase formula $(AC)D_o + (CX)D_w = (BX)D_w$ with regard to CX, as demonstrated below:

Now:

$$AC + CX = AX$$

So,

$$AC = AX - CX$$

Substituting in the two-phase formula for AC:

$$(AX - CX)D_o + (CX)D_w = (BX)D_w$$

$$BX = \frac{(AX)D_o}{D_w} - \frac{(CX)D_o}{D_w} + \frac{(CX)D_w}{D_w}$$

Differentiating:

$$\frac{d(BX)}{d(CX)} = 1 - \frac{D_o}{D_w} \quad \text{or} \quad d(BX) = \left(1 - \frac{D_o}{D_w}\right)d(CX)$$

So the rise at B will be one minus the ratio of the density of the oil to water, multiplied by the corresponding rise at C. In the example cited before where D_o is 0.40 and D_w is 0.45, $\frac{d(BX)}{d(CX)}$ is 0.111. Thus for a 1-ft. rise at C the corresponding rise at B will be 0.111 ft.

Now there are maximum and minimum working heights in which the grasshopper overflow can work. The maximum height will be that which will cause water to flow out the oil overflow by complete displacement. The minimum height is that level at which oil will start to flow out of the grasshopper overflow. The maximum height is when CX displaces all of AX and the equation becomes

$$(AX)D_w = (BX)D_w \text{ or } BX = AX$$

The minimum working height is when

$$(AX)D_o = (BX)D_w \text{ or } BX = \frac{D_o}{D_w}(AX)$$

Thus in the example for maximum height $BX = 20$ ft. and for minimum height

$$BX = \frac{0.40}{0.45}(20) \text{ or } BX = 17.78$$

Therefore in the example the grasshopper overflow should not be over 20 ft. or under 17.78 ft. above the bottom of the water outlet of the gun-barrel tank.

In summarizing, by the use of the two-phase formula, its differentiated form, or its maximum and minimum forms the setting of the grasshopper can be made directly corresponding to the water level desired in the gun barrel without trial-and-error manipulating.

●

Volume on Colorado Oil And Gas Industry Announced

The department of publications of the Colorado School of Mines announces the publication of "The Oil and Gas Industry of Colorado," by Clark F. Barb, head of the department of petroleum engineering of the Colorado School of Mines. This is published as Volume 37, Number 2, of the Colorado School of Mines Quarterly.

It comprises 132 pages plus two three-page inserts containing tables and a large oil and gas map of Colorado in a pocket on the inside back cover. Numbers of maps, charts, tables, and oil analyses are combined with other data on oil and gas fields and refineries, and a discussion by the author of these subjects, as well as oil and gas reserves and oil shale and coal as substitutes.

Influence of Columbium Or Titanium Additions To 5 Cr Mo Steel

PART 2—HIGH-TEMPERATURE PHYSICAL PROPERTIES

(This is the eighth in a series of articles by the author)

By C. L. CLARK
Timken Roller Bearing Co.

ALTHOUGH columbium or titanium additions are made to 5 Cr Mo steel primarily for reducing the hardness after air cooling or welding it is necessary to ascertain the influence of these additions on the high-temperature strength characteristics as these modifications are often used in elevated-temperature service. In the evaluation of the influence of these two alloying elements on the high-temperature strength two different heat treatments should be considered. In one, the steels should be annealed, in order that a direct comparison will be possible with the standard 5 Cr Mo steel; while in the second an air-cooling treatment should be employed in order to reproduce the condition in which these steels will be generally employed commercially.

Table 1 gives the chemical composition, heat treatment, hardness, structural grain size and room-temperature physical properties of a standard 5 Cr Mo steel as well as of titanium and columbium modifications. In so far as the composition is concerned, the titanium and columbium modifications are very representative as the titanium-to-carbon ratio is 5.0 to 1, and the columbium-to-carbon ratio 7.4 to 1. In the annealed conditions the three steels possess a Brinell hardness below 150, while after the normalizing and tempering treatment the hardness of 5 Cr Mo + Ti is 143 and that of 5 Cr Mo + Cb is 170.

The rupture strength (100,000 hours) of these steels is given in Fig. 1. Regardless of the heat treatment the values of 5 Cr Mo + Ti are the same and inferior to 5 Cr Mo at each of the temperatures considered. After both heat treatments the columbium type is superior to 5 Cr Mo at 1,200° F. while the same is true at 1,000° F. only after the normalizing and tempering treatment. Heat treatment does, therefore, have an influence on the rupture strength of the columbium modification, but not on the titanium type.

The creep resistance of these same steels is shown in Fig. 2. Again the addition of titanium has reduced the 1,200° F. strength but is without influence at 1,000° F. Neither does heat treatment alter the creep strength. For the higher creep rate, columbium additions improved the strength with the degree of improvement being more pronounced after the tempering treatment than after annealing. Likewise, for the lower creep rate the tempering treatment was superior.

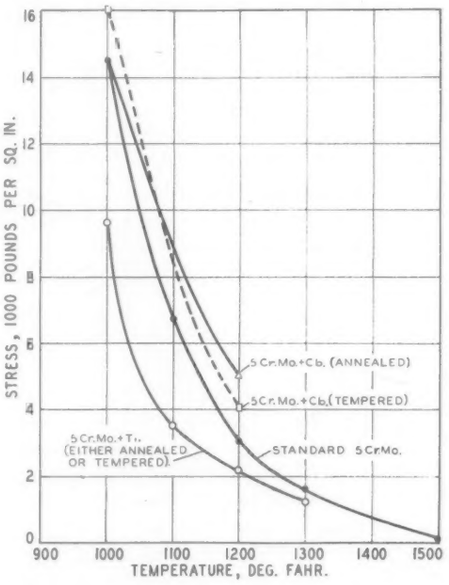


Fig. 1—Influence of titanium and columbium additions on the rupture strength (100,000 hours) of 5 Cr Mo steel

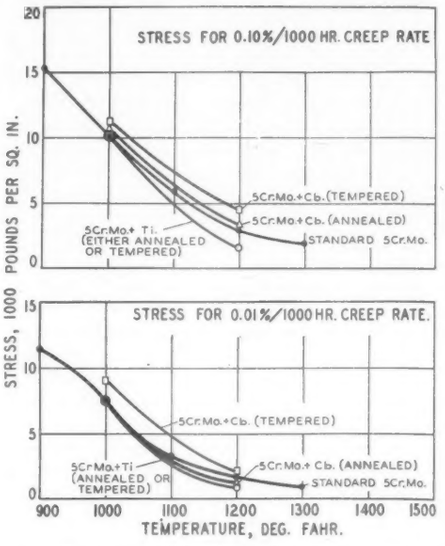


Fig. 2—Creep characteristics of titanium and columbium modifications of 5 Cr Mo steels

The test results obtained from the individual rupture and creep specimens of the columbium and titanium modifications were much more erratic than previously obtained with any other steels. This may be due to segregation in steels of these types, or to the fact that they are, because of their nature, nonuniform. In other words, in order for these elements to be effective in reducing air hardening, the carbon must be precipitated as carbides and this in itself produces nonuniformity. The values given in Figs. 1 and 2 are, however, believed to be representative of these steels.

On the basis of the values given the addition of columbium or titanium, and especially titanium, to steels of the 5 Cr Mo type would not be justified in so far as their influence on the high-temperature strength is concerned. As previously shown, however, both of these elements are effective in reducing the hardness after air cooling or after welding and can be successfully used for this purpose.

TABLE 1—DESCRIPTION OF TITANIUM AND COLUMBIUM MODIFICATIONS OF 5 CR MO STEELS

A.—Chemical Composition

Type steel—	C	Mn	Si	Cr	Mo	Ti	Cb	Ti or Cb ratio to C
5 Cr Mo	.10	.45	.18	5.09	.55			
5 Cr Mo + Ti	.10	.44	.38	4.98	.50	.51		5.1
5 Cr Mo + Cb	.08	.44	.31	5.01	.51		.59	7.4

B.—Heat Treatment, Hardness and Structural Grain Size

Type steel—	Heat treatment, °F.	Brinell hardness	Structural grain size
5 Cr Mo	Ann. 1550	128	6-8
5 Cr Mo + Ti	Ann. 1600	126	8
5 Cr Mo + Ti	Tempered 1380 (4 hr.)*	143	8
5 Cr Mo + Cb	Ann. 1600	143	8
5 Cr Mo + Cb	Tempered 1380 (4 hr.)*	170	duplex

C.—Room Temperature Physical Properties

Type steel—	Type heat treatment	Tensile strength	Yield strength 0.2% set	Proportional limit	Elong % in 2 in.	Red of area
5 Cr Mo	Annealed	66,500	26,250	19,000	39.0	80.5
5 Cr + Ti	Annealed	65,000	28,000	10,000	42.0	80.7
5 Cr + Ti	Tempered	69,000	32,000	17,500	40.0	79.7
5 Cr Mo + Cb	Annealed	72,000	36,500	22,500	33.0	76.6
5 Cr Mo + Cb	Tempered	83,750	65,500	45,000	25.0	77.0

*Normalized 1,750° F. before the tempering treatment.

Safe Practices for Cleaning Tanks Described in New A.P.I. Manuals

Recommended safe practices for cleaning crude petroleum and gasoline storage tanks are described and illustrated in two manuals published by the American Petroleum Institute's Department of Accident Prevention.

Section A, "Crude-Oil and Unfinished-Products Tanks," covers petroleum-vapor fires and explosions; sources of combustible vapor mixtures; sources of vapor ignition; toxic gases and vapors; oxygen deficiency; use of tools, planning and inspection; draining and isolating tank; removal of gases and vapors; opening tank; iron-sulfide deposits; removal of sediment; etc.

Section B, "Gasoline Tanks," covers in general the same subjects, but with special emphasis on the different hazards, the smaller tanks often involved, and the extra precautions necessary with leaded gasolines.

CO$T Engineering

A WEEKLY FEATURE OF THE OIL AND GAS JOURNAL — PUMPING

APRIL 23, 1942

COMPARISON OF COST OF PUMP WORKING-BARREL OPERATION

ONE of the major factors in the cost of producing oil is the subsurface pump run in the well. Fundamentally all pumps work on the same principle, and can be classified into three groups: rod-type pumps, tubing pumps and casing pumps. The working barrel of the tubing pump is run on the bottom of the tubing while the plunger is run in on the rod string. On rod-type pumps, the barrel and the plunger are run in on the rod string, a seating arrangement between the outer part of the barrel and the tubing effecting a seal.

The number of different pumps made increases monthly, each one being designed to overcome certain difficulties. The selection of which pump to use is based on the operating condition and the experience of the operators.

Unfortunately many pumps are adopted on impressions rather than fact. The man selecting the pump may feel that he has been getting performance from one style of pump and he may be of the opinion that particular pump is cheaper than another. Examination of the facts may indicate that the impression is erroneous and that a change in pumps should be made.

The accompanying table shows a comparison of two different pumping arrangements tested in one field in an effort to reduce pumping costs by selecting the most economical method. In this case the service obtained from the cups used on the plungers in two different working barrels was used to select the proper working barrel.

Records were kept on six wells, three of which were equipped with common working barrels and three of which had working barrels with cast iron liners in them. Normally, when a well is equipped with a liner-type barrel, a steel plunger is used but in this case it was thought advisable to use four-cup plungers.

The cost of the cups in such a setup is strictly nominal but the cost of changing the cups is one of the principal items of production expense. In addition to the production lost through down time and the excessive fuel costs, there is the actual pulling of the rods in the well. After the barrel becomes worn, it is also necessary to pull the tubing and either replace the barrel or the liners. An increase in the frequency of the cup changes indicates that it is time to inspect the working barrel.

In checking the performance of cups, or of the plunger and liner, it is important to include the length of the stroke and the strokes per minute. An examination of the table will show that wells A and B, operating at 54-in. stroke and 26 s.p.m. showed more frequent cup replacements than the wells operating at 44-in. stroke and the same or fewer strokes per minute.

It will be noted that in every case there was a greater number of days (average) between cup changes with the liner barrels than with the common steel working barrel.

The following is the cost of the different types of barrels at the time these tests were made:

3-in. by 10-ft. jacket with bottom and top collars	$35.00
Ten new 3-in. liners	42.00
Total	$77.00
3-in. by 10-ft. jacket with bottom and top collars	$35.00
Ten 3-in. reground liners	21.05
Total	$56.65
Common steel working barrel	$23.05

It is estimated that the jacket and collars will last at least three liner changes which would bring down its cost to $11.87 per liner change. At this frequency the cost for each liner working barrel would be $53.87 with new liners and $32.93 with reground liners.

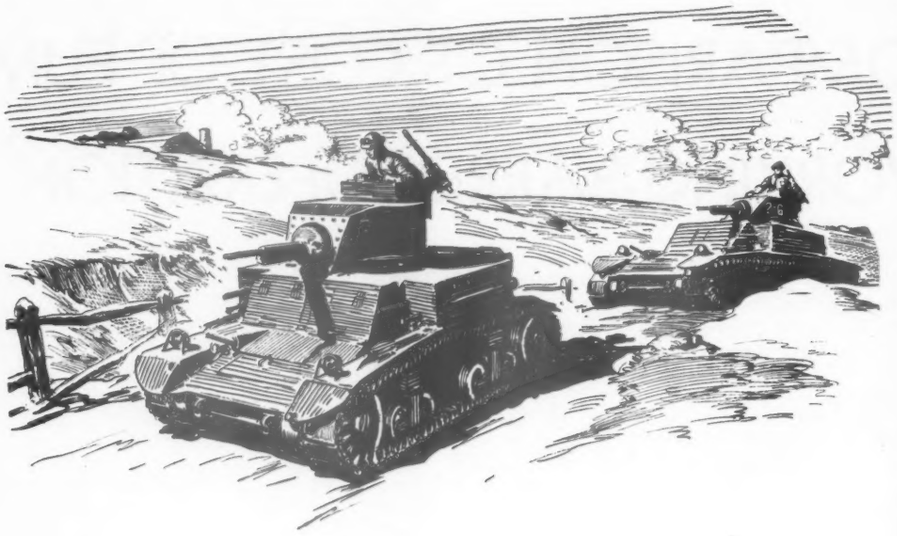
The average savings of the liner type over the common type in this particular case amount to $0.08 per day. At this rate it would take 262 days to pay out a liner-type working barrel with new liners and 124 days with reground liners. The difference in cost between the new common-steel barrel and the liner-type with new liners is $20.94 and the difference with reground liners is $9.88.

As the liners absorb the wear of the pumping operation, the same results might be accomplished with a liner-type barrel made from some cheaper material, such as cast iron. Such a barrel would have to be kept within the A.P.I. tolerances.

It is important to keep performance records on all type pumps. It should also be remembered that conditions change, both on the well and in the comparative cost of equipment. Considerable money can be saved by a periodic examination of the situation.

The only way of determining the value of a new type pump being offered is to test it in operation and compare the result with records of previous installations.

Well	Type barrel—	Days service	Average Fluid	Average S.p.m.	Average Stroke (in.)	Cup changes No.	Cup changes Av. days between	Cup changes Cost	Cost per day
A	3-in. common steel	392	1,300	26	54	13	31	$115.18	$0.296
B	3-in. liner with cast iron liners	497	1,330	26	54	9	55	79.74	0.16
	T-67-3-A-4								
C	3-in. common steel	415	510	23	44	10	41.5	88.60	0.213
D	3-in. liner with cast iron liners	109	530	23	44	1	109	8.86	0.0813
	T-88-L-1								
E	3-in. common steel	379	900	25	44	7	54	62.07	0.164
F	3-in. liner with cast iron liners	500	1,100	26	54	8	62.5	70.88	0.141



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CO$T Engineering

A WEEKLY FEATURE OF THE OIL AND GAS JOURNAL — PRIME MOVERS

APRIL 23, 1942

EFFECT OF POWER FACTOR ON COST

ONE of the most important sources of energy for prime movers used in the production of oil and in drilling operations is electrical power. The power is supplied by public utility companies or by electrical generating units on leases or in plants. For the most part, the electrical equipment used in production and drilling is operated by alternating current although there are installations using direct current.

For any particular job there is one motor which will give the best overall operating efficiency. Selection of the motor is by no means simple and is a technical problem fraught with complications. In addition, there may be circumstances which alter the selection. However, there is one point which is often considered as a minor one but which has considerable effect on the operating costs of the property. This is the power factor of the motor when used on a particular job.

Normally the term power factor is associated with the method used by public utilities in computing the charges for electric current consumed. Actually, it is based on the operating characteristics of machines consuming electrical energy and the costs which must be charged to the power factor are present regardless of whether the current is purchased or is generated by the user.

A low power factor has a detrimental effect upon the operation of the system. For a given amount of power the current consumed is larger for a machine having a low power factor. Larger generators and transmission lines are required and the cost of the system is greater. An excessive voltage drop in transmission, poor voltage regulation and trouble with the alternators may also be expected to result from a low power factor.*

From a practical standpoint, the power factor should be kept as near unity as possible as the cost of the energy will be reduced thereby. There are practical limits as ultraefficient machines are expensive. Economics justify the expense of increasing the power factor to about 0.92, but beyond this point additional efficiency is gained only by adding materially to the investment.

The effect of the power factor is shown clearly if the bills from the utility company for power used in two similar installations are analyzed.

In the case cited, electric power is used for operating compressors on small repressuring projects. Much of the equipment used on these projects was reclaimed and reconditioned before being installed in the present location. The first plant built was designed to pull a greater vacuum than the second plant which was subsequently installed. The second plant was also designed in the light of experience gained from the operation of the original plant.

The first plant is equipped with 40-hp. and 30-hp. three-phase induction motors for driving a pair of compressors and a 2-hp. motor for driving the radiator fan. The second plant is equipped with a 30-hp. motor (three-phase induction) for operating the compressor and a 0.5-hp. motor for the radiator. The current is measured through separate meters to each plant.

The effect of the power factor on the cost of current is shown in the power bills for the two installations. Using a net figure, the demand charge for the current used in the original plant is approximately 13 per cent greater per kilowatt than for the second plant. The power factor for the original plant is 0.710 and for the second plant is 0.798, a difference of 0.088. The rate is based on a power factor of 0.80 and if the power factor is lower than that an upward revision is made in the bill. Cost per kilowatt hour cannot be compared directly due to the sliding-scale method of figuring the bill.

The motors in the original plant have a total rating of 72 hp. and at full load would use about 53.5 kw. These motors are operated only at a portion of their capacity and during the period for which the meter was read the power consumption was at the rate of 40.32 kw. per hr. A correction must therefore be made in the bill from a power factor of 0.71 to a power factor of 0.80, or $0.80 \times 40.32/0.71 = 45.43$ kw. per hr., this amount being used to figure the demand charge.

In the second plant the total rated horsepower is 30.5. Current consumed at a power factor of 0.798 amounted to 28.8 kw. per hr. As the power factor is approximately the same as the base rate, no correction is made in the billing and only that amount of power is paid for.

In other words, failure to have the motors in the original plant fully loaded resulted in a higher charge per kilowatt for the energy consumed due to the power factor and lower mechanical efficiency. By correcting the power factor a saving of $7.67 per month could be effected.

*Elements of Electrical Engineering, Arthur L. Cook.

TABLE 1

Motor:	Rated hp.	Rated amp.	Amps. tested L-1	Amps. tested L-2	Amps. tested L-3	Voltage tested	K.v.a. $1.73 \times E \times a$	P.F.	Horsepower Kva. $\times 0.746$ P.F.	Compressor data Press. Lb./sq. in.	Compressor data Vac. (in.)	Compressor data Vol. (cu. ft.)
Lease A:												
No. 1	40.0	50.5	26.0	27.0	27.0	488	22.40	0.710	23.5	47.0	12.6	256M
No. 2	30.0	37.0	25.0	25.0	26.0	...	21.40	...	22.5	...	...	...
No. 3	2.0	2.9	1.2	1.6	1.3	...	1.18	...	1.24	...	...	...
Lease B:												
No. 1	30.0	39.0	28.0	28.0	27.0	466	22.30	0.798	21.7	27.0	19.3	111
No. 2	0.5	1.04	0.4	0.6	0.6	...	0.43	...	0.4	...	...	...

TABLE 2

Demand	Constant	Kw.	Billing demand (kw.)	Demand charge	Demand cost/kw.	Net bill	Net cost /kw.-hr.	Net cost /kw.
42	0.96	40.32	45.43	$68.15	$1.69	$370.85	$.0145	9.01
30	0.96	28.8	28.8	43.20	1.50	244.58	.0153	8.49

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Engineering Fundamentals

A WEEKLY FEATURE OF THE OIL AND GAS JOURNAL No. 10

APRIL 23, 1942

THE LAW OF PERFECT GASES

THE law of perfect gases is an indispensable tool to the engineer or field man who deals with calculations concerning the measurement of natural gas under various conditions of pressure and temperature.

The law of perfect gases is based upon two fundamental gas laws; namely, Boyle's law and Charles' law.

According to Boyle's law, when the temperature of a definite weight of perfect gas is held constant the gas volume will decrease proportionately as the absolute pressure on the gas is increased or the volume will increase proportionately as the absolute pressure is decreased.* This law is illustrated in Sketch "A." The law is often expressed as:

$$P_1V_1 = P_2V_2 = P_3V_3 = \text{Constant}$$

For the particular example shown in Sketch "A," the value of the constant is 600.

Charles' law states that when the pressure on a definite weight of gas is held constant the gas volume will decrease proportionately as the absolute temperature of the gas is decreased or the volume will increase proportionately as the absolute temperature is increased.* This fact is illustrated by Sketch "B." The law is often expressed as:

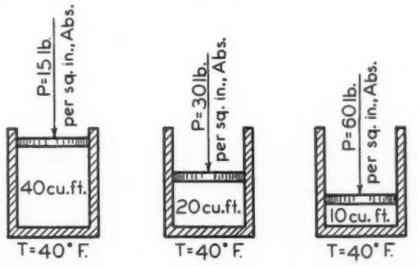
$$V_1/T_1 = V_2/T_2 = V_3/T_3 = \text{Constant}$$

For the example shown in Sketch "B," the value of the constant is 0.04

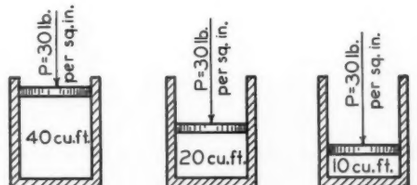
By combining Boyle's law and Charles' law, the law of perfect gases is obtained. In the form of a mathematical equation, the law may be written as:

Case 1 Case 2 Case 3 any case

$$P_1V_1/T_1 = P_2V_2/T_2 = P_3V_3/T_3 = P_nV_n/T_n = R \text{ (a constant)}$$



A. BOYLE'S LAW


P=30 lb. per sq. in.
40 cu.ft.
T=540° F. or 1000° F. Abs.
P=30 lb. per sq. in.
20 cu.ft.
T=540° F. or 1000° F. Abs.
P=30 lb. per sq. in.
10 cu.ft.
T=540° F. or 1000° F. Abs.
V/T = 40/1000 = 20/500 = 10/250 = 0.04

B. CHARLES' LAW

The values of P, V, and T, in the equation may be in any convenient units as long as the units used in all instances (Case 1, 2, 3, etc.) are the same. It should also be remembered that P and T must be in absolute units, and that Case 1, 2, 3, etc., all deal with the same weight of gas.

The use of the law of perfect gases is limited somewhat by the fact that all gases, including natural gas, do not obey the law exactly. At high pressures, particularly at low temperature, the actual volume of gas has been found to be different to the volume calculated by using the perfect gas law. For the ranges of temperature and pressures ordinarily encountered this deviation from the law may often be neglected. A later installment will deal with a consideration of this deviation. It is of value first to consider the use of the law in dealing with problems where sufficient accuracy can be obtained without considering the deviation.

Example 1.

Problem.—A large positive displacement meter measures the gas that passes through a main line. Downstream from the large meter the main line branches into two smaller lines to deliver the gas to two points of use. Each of the two branch lines is equipped with a small meter.

During a certain day of operation one of the small meters measured a volume of 25,000 cu. ft. at an average temperature of 90° F. and an average pressure of 10 lb. per sq. in. gage. The other small meter measured a volume of 29,300 cu. ft. at an average temperature of 60° F. and an average pressure of 13.5 lb. per sq. in. gage. The main-line meter measured the gas at an average pressure of 26 lb. per sq. in. gage and an average temperature of 50° F. Atmospheric pressure at all meters is 14.3 lb. per sq. in.

If the main-line meter is measuring accurately and no gas is lost or added to the line between it and the small meters, how many cubic feet of gas should it indicate as passing through it during the day for which the data is given?

Solution.—It can be assumed that the pressure and temperature conditions of the gas between the large meter and the two smaller meters were the same at the beginning of the period as they were at the end of the period. In such a case, the same weight of gas that passes through the two small meters must pass through the large meter.

So the gas volumes measured by the two small meters should each be corrected to the volume occupied by the same gas under the temperature and pressure of the large meter. The sum of the two corrected volumes, then will give the reading that should be indicated by the large meter. Such calculations follow:

First small meter: (Let Case 1 represent master-meter conditions)

$$P_1V_1/T_1 = P_2V_2/T_2$$

$$V_1 = \frac{P_2V_2T_1}{P_1T_2} = \frac{(10 + 14.3) \times 25{,}200 \times (50 + 460)}{(26 + 14.3) \times (90 + 460)} = 14{,}087 \text{ cu. ft.}$$

Second small meter: (Let Case 1 represent master-meter conditions)

$$V_1 = \frac{P_3V_3T_1}{P_1T_3} = \frac{(13.5 + 14.3) \times 29{,}300 \times (50 + 460)}{(26 + 14.3) \times (60 + 460)} = 19{,}836 \text{ cu. ft.}$$

So the large meter should indicate the passage of 14,087 + 19,836, or 33,923 cu. ft.

*Absolute pressure was defined in Installment 3.

*Absolute temperature on the Fahrenheit scale is defined as 460 + °F. In other words, absolute zero in temperature is 460° below zero on the Fahrenheit scale.

Series prepared by Glenn M. Stearns, associate professor of petroleum engineering, University of Oklahoma

Engineering Fundamentals

A WEEKLY FEATURE OF THE OIL AND GAS JOURNAL

No. 11

APRIL 23, 1942

DEVIATION OF NATURAL GAS FROM THE LAW OF PERFECT GASES

As stated in Installment 10, natural gas does not conform exactly to the perfect gas law. When dealing with gas volumes at the higher pressures often existing in gas sands, gas-transmission lines, compressors, and other producing and distributing facilities, it is often necessary to consider the deviation of natural gas from the perfect gas law in order to secure accurate results from calculations.

It has been found by experimentation that natural gas is more compressible than would be indicated by the perfect gas law. This means that if a certain amount of natural gas were measured at some low pressure and then compressed to some higher pressure, the volume actually measured at the higher pressure is less than the volume that would be calculated by use of the perfect gas law to correct the measured volume from the lower pressure to the higher pressure. This also means that with a decrease in pressure natural gas is more expansible than would be indicated by the perfect gas law.

In this discussion, "deviation from the perfect gas law" will be used to mean: The measured volume obtained by reducing the pressure of a definite volume of gas to some standard pressure, minus the volume at the same standard pressure computed by the perfect gas law from the same initial pressure, divided by the latter. The deviation may be expressed either as a decimal or a percentage. With this "deviation" determined, a "deviation factor" equal to $1 + n$ (where n is the deviation expressed as a decimal), can be used appropriately as a multiplier or divisor to apply to values computed by the perfect gas law in order to obtain true volumes at any pressure and temperature other than that at which measurement is actually made.

The amount of deviation of a natural gas depends upon the relative quantities of the various hydrocarbons and other gases that constitute the natural gas. For this reason, no one set of definite values can be assigned which would apply strictly to all natural gases. For the most accurate results, values must be determined for each particular natural gas.[1] Experiments have shown that the deviation is greater for the heavier hydrocarbon gases than for the lighter hydrocarbon gases.

Table 1 lists deviation factors, $1 + n$, for methane. The values in this table are calculated from Bureau of Standards data[2] and are based on 14.7 lb. per sq. in., abs., and 32° F. That is, at this pressure and temperature the deviation factor is equal to 1.000.

Table 2 lists deviation factors, $1 + n$, for natural gas which is free of air and carbon dioxide. Values in this table have been calculated from orifice-meter data of the California Natural Gasoline Association.

Discussion and example problems in later installments will demonstrate the use of these tables.[3]

1. U. S. Bureau of Mines Technical Paper 539, "Deviation of Natural Gas From Boyle's Law," by Johnson and Berwald, describes a method that may be used.
2. Miscl. Pub. 71, 1925.
3. In many publications, deviation is expressed as the reciprocal of values given in Tables 1 and 2. Johnson and Berwald, in U. S. Bureau of Mines Technical Paper 539, however, express deviation in the same terms as used in Tables 1 and 2.

TABLE 1—DEVIATION FACTORS FOR METHANE (Specific Gravity = 0.553)

Gage pressure—	Temperature °F.						
	60	80	100	150	200	300	400
0	1.000	1.000	1.000	1.000	1.000	1.000	1.000
100	1.013	1.011	1.010	1.007	1.005	1.002	1.001
200	1.027	1.022	1.019	1.013	1.009	1.004	1.002
300	1.041	1.034	1.030	1.020	1.014	1.006	1.002
400	1.055	1.046	1.040	1.028	1.018	1.007	1.003
600	1.083	1.071	1.060	1.042	1.027	1.010	1.002
800	1.115	1.096	1.080	1.055	1.036	1.013	1.002
1,000	1.147	1.121	1.099	1.067	1.045	1.017	1.002
1,200	1.176	1.144	1.119	1.080	1.052	1.019	1.002
1,400	1.205	1.167	1.136	1.089	1.057	1.020	1.002
1,600	1.230	1.188	1.152	1.099	1.062	1.020	1.000
1,800	1.252	1.205	1.166	1.105	1.064	1.020	.998
2,000	1.269	1.220	1.178	1.109	1.066	1.020	.996
2,200	1.280	1.229	1.185	1.111	1.067	1.018	.993
2,400	1.285	1.233	1.188	1.111	1.067	1.016	.990
2,600	1.285	1.232	1.188	1.111	1.065	1.014	.986
2,800	1.282	1.227	1.185	1.110	1.062	1.010	.981
3,000	1.277	1.220	1.179	1.106	1.058	1.006	.977

TABLE 2—DEVIATION FACTORS FOR NATURAL GAS (Free of air and carbon dioxide)

Specific gravity	°F.	Gage pressure, lb. per sq. in.							
		100	200	300	400	500	600	700	800
	60	1.013	1.030	1.047	1.065	1.082	1.099	1.116	1.134
	80	1.012	1.027	1.041	1.056	1.071	1.087	1.100	1.114
	100	1.010	1.024	1.033	1.048	1.060	1.074	1.087	1.099
	200	1.006	1.013	1.019	1.026	1.032	1.038	1.045	1.052
0.60	400	1.002	1.005	1.007	1.009	1.011	1.014	1.016	1.018
	60	1.020	1.045	1.070	1.100	1.130	1.157	1.188	1.220
	80	1.018	1.040	1.062	1.086	1.111	1.136	1.161	1.189
	100	1.016	1.034	1.054	1.075	1.096	1.119	1.140	1.163
	200	1.009	1.018	1.029	1.040	1.050	1.060	1.073	1.080
0.70	400	1.003	1.007	1.011	1.014	1.018	1.022	1.026	1.030
	60	1.028	1.062	1.099	1.140	1.185	1.227	1.272	1.319
	80	1.025	1.054	1.086	1.122	1.160	1.190	1.229	1.266
	100	1.021	1.047	1.076	1.107	1.138	1.163	1.193	1.224
	200	1.012	1.026	1.042	1.057	1.073	1.091	1.106	1.124
0.80	400	1.005	1.009	1.015	1.020	1.027	1.032	1.038	1.045
	60	1.036	1.082	1.133	1.190	1.250	....	....	....
	80	1.032	1.072	1.115	1.160	1.028	....	....	....
	100	1.029	1.062	1.096	1.130	1.167	....	....	....
	200	1.016	1.033	1.049	1.067	1.083	....	....	....
0.90	400	1.006	1.012	1.018	1.025	1.031	....	....	....
	60	1.047	1.109	1.176	1.250	1.330	....	....	....
	80	1.041	1.093	1.147	1.205	1.269	....	....	....
	100	1.037	1.080	1.125	1.174	1.222	....	....	....
	200	1.020	1.042	1.064	1.085	1.107	....	....	....
1.00	400	1.008	1.015	1.024	1.031	1.040	....	....	....
	60	1.074	1.175	1.290	1.410	....	....	....	....
	80	1.064	1.151	1.242	1.342	....	....	....	....
	100	1.056	1.129	1.209	1.295	....	....	....	....
	200	1.030	1.066	1.105	1.145	....	....	....	....
1.20	400	1.011	1.025	1.038	1.053	....	....	....	....
	60	1.112	1.271	1.441	....	....	....	....	....
	80	1.098	1.225	1.364	....	....	....	....	....
	100	1.083	1.195	1.321	....	....	....	....	....
	200	1.043	1.098	1.156	....	....	....	....	....
1.40	400	1.016	1.035	1.056	....	....	....	....	....

Series prepared by Glenn M. Stearns, associate professor of petroleum engineering, University of Oklahoma

QUESTIONS ON TECHNOLOGY

W. L. NELSON

This department of The Oil and Gas Journal is devoted to the manufacturing branches of the oil industry.

Those connected with the refining of crude petroleum, the manufacture of natural gasoline and closely allied industries are invited to submit their problems to W. L. Nelson, technical editor. The department was created for the purpose of aiding managers, superintendents, engineers, chemists, and all those engaged in the various phases of plant operation; also those connected with the marketing and utilization of petroleum products.

Questions should be submitted in as much detail as possible. Inquiries must be signed but only the given initials will be printed. The source of the question is considered to be confidential.

Questions requiring a discussion of patents, extended computations, or a detailed study cannot be considered. When the matter is of general interest, a reply will be published within a reasonable time.

Testing for Coking Quality Of Cracking Stock

We are interested in getting information on tests that can be applied to clean cracking stocks to determine the quality of the charge with relation to coking tendency. Can you tell us of tests that can be applied and the general interpretation of such tests as well as the carbon residue and aniline points that are used for this purpose?—F. W. K.

Scarcely any information is available on this subject although there appears to be a general recognition that such tests should be significant. Such a situation is not altogether unexpected because the process of decomposition is indeed complicated. The ultimate reason for conducting such tests as carbon residue or aniline point on a cracking stock, is to avoid the formation of coke in the tubes. Thus, the quality or characteristics of the charge (or recycle) stock is not the only factor because an equally important factor is the extent of cracking or decomposition that is practiced per pass. Yield is fundamentally a function of gravity (only indirectly of temperature and time), and hence it would seem that any properties such as carbon residue, aniline point, characterization factor or unsaturation, would differ for each stock depending upon its gravity or boiling range. Finally, there is such a wide variety of different cracking (and recycle) stocks that each refiner must to a large extent accept the responsibility of determining what values of these auxiliary chemical-control properties are most suitable for his particular charge stocks and particular cracking equipment.

The carbon residue and aniline points that are maintained by one refiner for his three clean cracking stocks are as follows:

Stock and operation—	A.P.I.	Carbon residue, per cent	Aniline point, °F.
Black heavy charge, once through	15.0	0.2-0.3	.....
Light furnace charge, recycling	25.7	1	60-100
Heavy furnace charge, recycling	16.4	2-3	90-120

Various means of gaging the tendency of the stock to deposit carbon would include two types of tests—those to evaluate the boiling range and those to evaluate the carbon hydrogen ratio. For measuring the carbon hydrogen ratio such tests as gravity, aniline point, carbon residue, percentage unsaturation, and iodine or bromine number would be pertinent. The boiling range and end point could be measured directly or could be introduced in conjunction with specific gravity as in the characterization factor which is defined as the cube root of the absolute temperature (° F.) divided by the specific gravity at 60° F. Rude Junkins and Barnes (Refiner and Natural Gasoline Manufacturer, Nov. 1938, p. 583) suggest the use of a "stock factor" which consists of the product of the A.P.I. gravity times the aniline point divided by 1,000, as a measure of the crackability of a stock. Note that this factor is the same as the diesel index except that in the case of the latter the product of gravity and boiling point is divided by 100 rather than 1,000.

No specific information on the relation of these factors to the tendency to coke deposition appears to be available, even in the case of the refiner whose limits are listed above.

Temperature Rise in Compression

How much should the temperature increase in compressing natural gas?—S. H.

The temperature rise that occurs in the compression of a gas is governed by the thermodynamic relation

$$\frac{T_2}{T_1} = \left(\frac{P_2}{P_1}\right)^{\frac{n-1}{n}}$$

in which T_2 and T_1 are the outlet and inlet absolute temperatures in °F., P_2 and P_1 are the absolute outlet and inlet pressures, and n is a constant which is related to the specific heat of the gas.

If the gas is compressed in such a way (adiabatic) that no heat is lost through the walls of the equipment, or heated through the walls of the equipment, the value of n is equal to the ratio of the specific heat at constant pressure to the specific heat at constant volume. In commercial compressors some heat is always lost through the walls of the compressor cylinders, and hence the value of n is less than for adiabatic compression.

The ratio of specific heats for the paraffin hydrocarbons are somewhat as follows:

Methane	1.307 at 30°F.
Methane	1.232 at 212°F.
Ethane	1.22 at 59°F.
Ethane	1.19 at 212°F.
Propane	1.13 at 61°F.
Isobutane	1.11 at 59°F.

Thus, a gross average value of n would be about 1.24 for a common gas composition and an average temperature in low-pressure compressors. The value in actual compressors would, however, be somewhat less due to heat losses, and might be of the general magnitude of 1.2. This value is substantiated to some extent by the following values of n which were computed from recorded temperatures and pressures for 23 commercial compressors.

	Ave. n	Range of value
13 low-pressure compressors	1.18	1.11-1.27
10 high-pressure stage of compression	1.20	1.03-1.30

Various values ranging from 1.22 to 1.275 are used in the textbooks, etc., and it appears that these values have been based on adiabatic compression rather than on the performance of actual compressors. The chart given in the yearly book of the Natural Gasoline Supply Men's Association is based on a value of n of 1.2125.

In order to use the above relationship it is necessary to resort to logarithms or a slide rule. If the inlet temperature and pressure are 60° F. and 15 lb. per sq. in abs. and the gas is to be compressed to 90 lb. per sq. in. abs., the equation would read

$$\frac{T_2}{(60+460)} = \left(\frac{90}{15}\right)^{\frac{1.2-1.0}{1.2}} = 60.167$$

$\log T_2 = \log 520 + 0.167 \log 6$
$\log T_2 = 2.716 + 0.167\ (0.7785)$
$T_2 = 700°$ F. abs. $= 240°$ F.

The temperature is vitally affected by the value of n that is used. Thus in the above illustration if a value of $n = 1.1$ is used, the temperature would be 152° F., and if $n = 1.275$, the temperature would be 306° F.

Absorber Computations

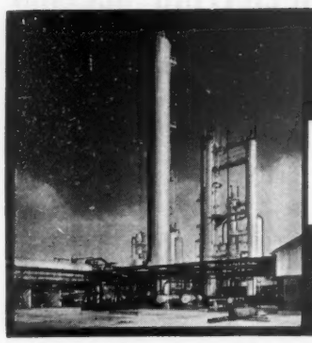
How can I compute the amount of absorption that will result with various circulations of oil?—G. C. T.

The percentage absorption of any hydrocarbon in an ordinary 16-plate absorber operating with a normal oil can be computed by means of the following formula:

$$\text{Per cent absorbed (below 60\%)} = 0.0128(G/K)$$

$$\text{or} = 0.0128(GP/p)$$

The "per cent absorbed" refers to the percentage of hydrocarbons in the gas that is absorbed into the oil, G refers to gallons of absolute oil circulated per 1,000 cu. ft. of gas, P refers to the absolute pressure in the absorber, K is the equilibrium constant for the hydrocarbon being absorbed or p is its vapor pressure at the tower temperature. Above 60 per cent absorbed, a larger oil recirculation is required, being 50 per cent larger than the formula answer when absorbing 99 per cent. It is strongly recommended that a more thorough knowledge of absorber operation be gained rather than to use the above formula—i.e. to refer to such books as "Petroleum Refinery Engineering" (The Oil and Gas Journal Book Department), wherein absorber design is discussed along with illustrations.



REFINERY ACTIVITY AND EXPANSION

Simplification of Military-Product Specifications Reported to N. P. A.

CLEVELAND, Ohio.—Substantial progress has been made in the simplification of specifications for Army and Navy fuels and lubricants and still further improvement is anticipated, according to Capt. J. H. Fitch, U.S.A., and Lt. Harold F. Galindo, U.S.N., who spoke here April 16 before the Department of Standards and Tests of the National Petroleum Association's thirty-ninth semiannual meeting.

Accomplishments in the field of simplification by the War Department Committee on Liquid Fuels and Lubricants were listed as follows by Captain Fitch:

1. The number of types and grades of gasoline has been reduced to a single all-purpose grade of 80 octane which will be used exclusively by the Army in the field though lower grades are authorized for post, camp and station use whenever suitable.

2. Diesel fuels, primarily for tanks, are limited to two grades—summer and winter.

3. A specification for diesel engine lubricating oils of detergent type has been prepared which includes two grades—SAE 10 and 30, for winter and summer respectively.

4. The number of grades of gasoline engine lubricating oils has been reduced to three—SAE 10, 30 and 50.

Four additional projects are under consideration by the committee:

1. If current tests indicate that the detergent-type diesel-lubricating oil is entirely satisfactory for gasoline engines, the use of straight mineral type oils will be eliminated and the use of a heavy duty oil specified both in gasoline and diesel engines.

2. A proposed draft of specifications to cover a universal gear lubricant has been prepared.

3. The number of greases has been reduced to five.

4. Specifications covering packaging have been proposed. Packaging of lubricating oils in 1-qt., 5-qt., and 5-gal. metal containers; greases and gear lubricants in 25-lb. containers and miscellaneous oil products in 1-qt. containers have been tentatively adopted.

Lieutenant Galindo reviewed the Navy fuels and lubricants problems product by product. He said that the only fuel problem was one of actual supplies. Diesel-fuel specifications closely parallel commercial practices and have been waived, when possible, to get supplies. The lighter viscosity now required for Navy special fuel oil has presented a problem in the difficulty in obtaining blending material, but here again the deficiency is more of quantity than quality. It has been necessary to establish an approved list to insure compatibility and stability as well as regular physical tests.

The trend is definitely toward additives for diesel lubricating oils. Detergent-type oils have been found most satisfactory for marine diesels and the use of one all-purpose oil is important aboard ship where it is necessary to simplify the storage problem. The demulsibility specification must be such that it will insure the possibility of centrifuging out of water. One requirement is that the oil will perform well with up to 2 per cent of sea water.

Lieutenant Galindo said that the Navy is practically all out for filters. It has been found, he said, that some engines will use a straight mineral oil satisfactorily if the oil is kept clean. The one requirement of the filter is that it be of a type that will not affect the additives. Straight mineral oils have been found unsatisfactory as turbine lubricants due to rusting troubles. The possibility of fortifying the additive aboard ship has been suggested and Lieutenant Galindo asked the industry to give this problem its consideration.

In conclusion, Lieutenant Galindo urged the use of domestic instead of imported materials, such as rape seed, due to the difficulty liable to be encountered in obtaining them, requested oil companies to put the Army or Navy symbol on all shipments going abroad since they may be destined for military use and asked that all precautions be taken to insure good inspection of products, in particular to see that seals are perfect.

Hugh Hemmingway, Kendall Refining Co., Bradford, Pa., also gave a report on the progress in engine testing, citing the shortening of some tests and the possibility of shortening others.

●

Phillips to Build Another 100-Octane Plant in Kansas

Phillips Petroleum Co. this week branded as "premature" an announcement that the company will construct a 100-octane plant at its refinery at Kansas City, Kans., although confirming general plans for such a project "somewhere" in Kansas.

The Phillips company operates a 23,000-bbl. refinery at Kansas City which includes facilities for cracking 12,000 bbl. daily.

Announcement of plans for construction of the 100-octane unit came from the office of Gov. Payne Ratner at Topeka, Kans.

Seven Independent Refiners Join in 100-Octane Project

Cooperative Refiners, Inc., has been organized by eight independent companies of Oklahoma and North Texas for construction and operation of a 100-octane gasoline plant near Duncan, Okla.

Defense Plants Corp., subsidiary of Reconstruction Finance Corp., will furnish $8,500,000 for construction of the plant and the entire output for a number of years will be purchased by Defense Supplies Corp., another federal agency. The plant will have capacity of 3,500 bbl. finished fuel daily, according to proposals.

Companies participating in formation of Cooperative Refiners, Inc., are Rock Island Refining Co., Ben Franklin Refining Co., Cosco Refining Co., Bell Oil & Gas Co., Panhandle Refining Co., La Salle Refining Co., W. T. Wagoner estate and Anderson-Prichard Refining Corp.

Under the plan of operation, the participating companies will furnish semiprocessed raw materials to the central plant for conversion to finished products. The arrangement probably will involve return of residual fuel oil to the supplying companies, a method of operation previously approved in principal by the OPC.

Manufacturers of Lube Oils Oppose Tax Increase

WASHINGTON, D. C.—Manufacturers of lubricating oil entered a strong plea here last week before the House ways and means committee opposing the proposed tax increase. The representations were made by Joseph E. Keller representing members of the National Petroleum Association, the Pennsylvania Grade Crude Oil Association, the Western Petroleum Refiners Association and the American Petroleum Industries Committee which include practically all lubricating-oil manufacturers.

Mr. Keller asked not only that the tax not be increased but that it should be removed from the revenue act entirely.

Mr. Keller pointed out that the proposed tax increase would fall upon a war necessity and it would heavily burden war industry, transportation and agriculture. He said that the entire war effort, either in the actual combat phases or in our essential industrial operations, depends upon lubricating oil.

●

Standard of Indiana and Subsidiaries Planning Extensive Refinery Additions

CHICAGO, Ill.—Construction of three alkylation plants, two installations for production of toluene, butane and naphtha isomerization units and participation in a large butadiene-recovery program are among the projects started, contracted or planned this year by Standard Oil Co. (Indiana) and its refining subsidiaries.

This program, disclosed last week in the Standard of Indiana annual report, includes only the projects related to the production of war materials. A new power plant is under construction at Wood River, Ill., where contracts have been let for other "important" units.

The company is preparing to build alkylation and butane and naphtha isomerization plants at the Whiting, Ind., refinery. Contract has been negotiated with the Government for a toluene plant at Whiting which will manufacture as much TNT as was produced in the whole United States in the first World War.

The Utah Oil Refining Co., a subsidiary operating a plant at Salt Lake City, Utah, probably will build an alkylation plant and another such unit is planned at Texas City, Tex., where Pan American Petroleum & Transport Co. operates a large refinery. Facilities for recovery of toluene at Texas City are also under consideration.

Standard of Indiana is participating in a large

butadiene-recovery project in the Whiting, Ind., territory which will produce the basic commodity required for manufacture of synthetic rubber.

The company's report declared that every drop of 100-octane gasoline that can be wrung from existing units is being produced at the present time.

•

WHO'S WHO IN REFINING

Sun Oil Co.

EXPENDITURES of $20,000,000 or more for construction of new refining facilities this year are proposed by Sun Oil Co., which operates one of the largest plants on the East Coast supplying an extensive network of product outlets. Much of the eastern marketing territory served by Sun is reached through product pipe lines extending from its largest refinery at Marcus Hook, Pa., to western Pennsylvania, New York Harbor and northern parts of New York State.

The two operating refineries of Sun Oil Co. have combined crude-oil capacity of 120,000 bbl. daily and produce 48,000 bbl. of cracked gasoline through facilities of company and Houdry design. The company joined with Socony-Vacuum Oil Co., Inc., in commercial development of the Houdry catalytic refining processes, including cracking and reforming which constitutes one of the major processing developments of the past 5 years. Here is a summary of the company's refinery operations:

Location—	Crude-oil capacity (bbl. daily)	Cracked gasoline (bbl. daily)
Marcus Hook, Pa.	90,000	36,000
Toledo, Ohio	30,000	12,000
Yale, Okla.*	5,000	.....
Total	125,000	48,000

*Shut down.

Position of Sun Oil Co. at this particular time is unique because its operations include not only its oil business but also the conduct of one of the largest shipbuilding establishments in the country. Most of the shipyard's capacity is devoted to construction of oil tankers. Orders from the Maritime Commission and private interests were on the shipbuilding books for 123 vessels at the end of last year.

The refinery construction budget for this year covers a new plant for production of special grades of aviation lubricants and another plant to produce high-octane aviation gasoline. Expansion of the production program for war materials derived from petroleum may increase the company's construction operations.

The Pew family, a potent factor in Pennsylvania's industrial development, furnishes the nucleus around which is woven the network of petroleum and shipbuilding enterprises engaging 2,400 employes.

Until recent months, most of the Marcus Hook refinery's crude requirements were moved by tankers from the Gulf Coast where Sun concentrated its production drawn from numerous fields in the southwestern part of the country. Now, the company, along with other East Coast refiners, is moving substantial volumes of crude by overland facilities.

One of the most modern research and refinery-control laboratories in the East is maintained by Sun at Marcus Hook which is only a short distance from the company's home office at 1608 Walnut St., Philadelphia, Pa.

J. Howard Pew is president and chairman of the board. Vice presidents are J. N. Pew, Jr.; J. Edgar Pew; A. E. Pew, Jr., and S. B. Eckert. Frank Cross is secretary-treasurer and W. C. Pew is sales manager.

Research and development activities are under the direction of J. B. Hill, and C. H. Thayer is chief engineer. W. D. Mason is superintendent of the Marcus Hook plant; H. O. Cameron holds the same position at Toledo and C. B. Carter is in charge of the Oklahoma refinery, which is now inactive.

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Canada Modifies Duty on Imported Light Crude Oil

OTTAWA, Ont.—Crude petroleum not subjected to any other process than natural weathering and removal of foreign matter and water will be admitted into Canada duty free, when imported by oil refiners to be processed in their own plants. A new order specifices that crude lighter than 0.8155 specific gravity at 60° F. will be admitted free under the British preferential, intermediate and general tariffs, thus allowing duty-free imports from any country.

Under the old rates there was a duty on crude lighter than 0.8155 specific gravity.

High Priority Ratings Granted Canadian Refinery

TORONTO, Ont. — High priorities granted by both Canadian and United States governments will this year accelerate construction work on the refinery of the British-American Oil Co. at Clarkson, Ont.

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* Names on request.

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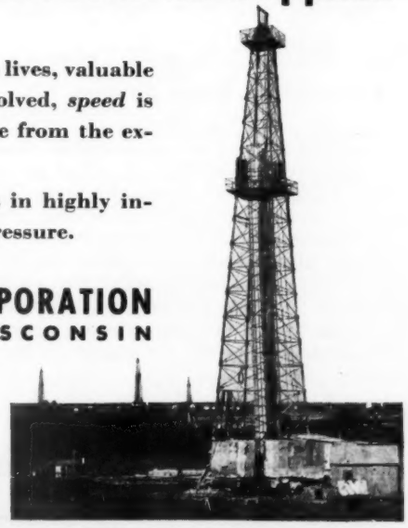

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Pipe-Line Activity

Arkansas Louisiana Gas Co. Progresses on New Project

Arkansas Louisiana Gas Co. has completed the laying of 31 miles of 12-in. for the gas system to transmit natural gas to plants in Arkansas. The remainder of the project consists of 91 miles of 18-in. Total mileage is 122 miles. Of the 18-in. pipe, approximately 20 miles has been strung, 8 miles welded and 2 miles completed. The contractor, Midwestern Engineering & Construction Co., has established headquarters at Malvern, Ark. The line extends between Magnolia, Lake Catherine and Bauxite, Ark.

Headquarters Are Established For Texas-Empire Construction

For the construction of 32 miles of 12-in. loops on the main line of the Texas-Empire Pipe Line Co., the contracting firm of Jones & Brooks is establishing field offices at Bloomington, Ill., where O. T. Mapes, superintendent, is in charge of construction operations for the contractor. The work will start about April 25 at the Heyworth pump station and will be completed near Wilmington, Ill.

Cities Service Increases Eastward Crude Shipments

Tank-car shipments of crude oil by Cities Service Oil Co. from the Heyworth, Ill., pump station of Texas-Empire Pipe Line Co. to the East Coast have been increased from 5,000 to 8,000 bbl. daily.

The company is making arrangements for shipping 4,000 bbl. daily by tank cars from Camp, Tex., in the East Texas field.

An attempt is being made to have tank-car shipments of Mississippi crude move eastward at the rate of 3,000 bbl. daily. From Rose, La., crude-oil tank-car shipments of the company are at the rate of 3,000 bbl. daily.

Most of this crude oil goes to the East Braintree, Mass., refinery. The remainder is shipped to the Philadelphia (Petty's Island), Pa., plant.

FPC Assigns Life of 38 Years To Canadian River System

Taking note of the fact that the Texas Panhandle field and the adjacent Hugoton field are the largest known reservoirs on natural gas in the world, Federal Power Commission states at the present and expected future rate of production of about 55,000,000 thousand cubic feet per year Canadian River Gas Co.s recoverable reserves will last more than 50 years. A life of 38 years (from December 31, 1939) was assigned to Canadian's main pipe line, in furtherance of the service life principle utilized by the commission in this proceeding.

WPB Refuses Permit For Tapco Proposal

The regional office of the War Production Board announced that Joseph B. Eastman, director of defense transportation, refused to certify a proposed crude-oil pipe line from Wichita County, Texas, to Savannah, Ga., as necessary for national defense.

The Trans-American Pipe Line Corp. sought to obtain permission to build the pipe line.

Mr. Eastman's action was based on a report by a three-member board which held a public hearing February 19, and on a statement by the War Department which said that because of its location the line would be of little value to the war program.

In rejecting the TAPCO proposal, Mr. Eastman indicated that other more economically feasible pipe lines to the East Coast might receive more favorable action.

"Upon the facts, as presented, and particularly in view of the total absence of support for the project from federal agencies concerned with the movement of oil, quite apart from the lack of evidence from shippers or receivers of oil," Mr. Eastman explained, "I am unable to recommend to the president that he issue the desired proclamation.

"However, I am of the opinion that additional pipe-line facilities which can substantially increase the flow of oil to the Atlantic seaboard area are 'necessary for national-defense purposes'," he added.

Eastman Designates Shields as Investigating Engineer

WASHINGTON, D. C. — Joseph B. Eastman, director of defense transportation, expressed his willingness to join any other governmental agencies in an investigation of the necessity for new pipe-line facilities and designated R. W. Shields, engineer for pipe lines of the interstate commerce committee, to represent his office in any such investigation.

Mr. Eastman stressed the need for realism with respect to the war program at the present time.

"If these were normal times, the steel necessary for new pipe lines would be readily available and whatever lines are needed could be built within a relatively short time," he said. "But the imperative steel requirements of the war effort are such that it is necessary to make maximum use of existing facilities before allocation of existing materials can reasonably be asked.

"In the case of pipe lines this may well mean an extensive relaying of existing pipe in new locations as well as the reversal of some lines in their present locations," he continued.

"Some measures of this character have been taken and others are contemplated. It may well be that in addition to such measures, some new pipe lines are needed for national-defense purposes. But such needs must be weighed in the balance with other war needs, for not all can be supplied."

Lines Built of Old and New Pipe May Help Relieve East Coast

Plans are being considered for digging up 1,400 miles of pipe lines of various kinds to be relaid in new projects to increase shipments northward to relieve the Atlantic seaboard shortage. Ten projects calling for old and new pipe have been proposed for this purpose including those considered for moving shipments from East Texas northward.

One project under consideration is the extension of the Plantation pipe line from Greensboro, N. C., to tidewater in Virginia. This will require the construction of a supply line from the Texas Gulf Coast area to the present intake point of the Plantation line, which is Baton Rouge, La.

It is reported that much of the machinery used to lay the Plantation gasoline pipe line from Baton Rouge to North Carolina is now available for the Texas line and can be quickly put into operation.

A comparatively large amount of new steel pipe, in addition to the used pipe which will be taken from oil lines, will be needed, but WPB officials have finally agreed to the use of the steel for this purpose.

Other loops in pipe lines would be constructed to move the oil east from Illinois, involving laying of lines across Ohio and making other connections.

For most of the smaller projects, it is planned to use old pipe taken from existing lines in Texas and the Mid-Continent area. Some of these lines are still in use, but their need is not considered as imperative as the new lines.

Pipe-Line Personalities . . . . . S. H. Elliott

S. H. ELLIOTT, vice president, Sohio Pipe Line Co., came into pipe-line operation 4 years ago from the position of purchasing agent of Standard Oil Co. (Ohio).

He was born December 8, 1901, in Lawrence, Kans., and was graduated from the University of Kansas in civil engineering in 1924. After working several years in designing and construction of bridges built in Kansas and New Mexico, he studied for 2 years at the School of Business Administration, Harvard University, and was graduated in 1929. His first and only job in the oil industry has been with the Standard Oil Co. (Ohio), where he started in the business research department in 1929. From there he went into the sales department where he was concerned with the development of sales of nonpetroleum products before he spent 4 years as the company purchasing agent.

In 1938 he was placed in charge of the operations of the company's pipe lines as manager of the department. In the winter and spring of 1940, Sohio Pipe Line Co. constructed the 240-mile 12-in. line from Illinois to Ohio under very unfavorable weather conditions. The project was contracted by Truman-Smith Construction Co. and Sheehan Pipe Line Construction Co. The line was completed in 64 days from the time construction started until the line was finally tied in.

His first steady job was "tying buds" in a nursery when he was 12 years old for which he was paid 75 cents per 10-hour day if it did not rain. With the exception of time spent in school he has been continuously occupied ever since at a variety of jobs, including working on farms, selling books, working in factories and on construction projects as well as other occupations.

Gasoline Pipe-Line Programs Are Affected by Emergency

A variety of changes in the operations of gaso line pipe lines has been required by the present emergency situation.

Phillips Petroleum Co. has increased shipments through the St. Louis-Chicago section of the company's 8-in. gasoline trunk line. Formerly shipments had been moving at less than two-thirds of capacity; at present the line is shipping at the full capacity of 20,000 bbl. per day.

Some consideration is being given to the possibilities of a program for utilizing the facilities of the Shell products line from Wood River, Ill., to Ohio points, and Standard of Indiana's Whiting Indianapolis products line so that together they might contribute most effectively to relieving the situation resulting from the East Coast shortage.

Plantation Pipe Line Co. has abandoned plans for a formal dedication of the company's system which is now in operation. An article on construction and equipment features of this project appears elsewhere in this issue.

Great Lakes Pipe Line Co. has contracted laying and take-up work to Midwestern Engineering & Construction Co. which is being carried on near Dixon, Ill. This was required by the necessity of relocating the line because of the construction of a new plant in that area. Laying of 23,000 ft of 6-in. used pipe has been completed. Taking up of 17,000 ft. of 6-in. started this week. Pipe taken up will be moved to the company's pipe stocks.

Gulf Builds Loading Rack At Dublin, Ind., Station

A loading rack to serve 50 to 60 tank cars daily is nearing completion at the Dublin, Ind., pipeline station of Gulf Refining Co. It is expected that it will be ready for operation within a week.

The company constructed more than 200 miles of loops on the main line to Dublin from Glenn Pool, Oklahoma, which has been reported to have increased capacity of the line to 55,000 bbl. daily. With certain changes in operating conditions it is possible that shipments might be handled at a somewhat higher rate.

Pipe-Line Shipments Are Increasing

Eastern crude pipe lines were used more extensively in March to move crude oil in an effort to relieve the transportation bottleneck caused by tanker sinkings and diversions.

The nine lines in the eastern group moved a total of 26.9 million barrels in March, an increase of 2,400,000 compared with February and of 7,300,000 compared with March 1941. For the first 3 months this year these lines moved 76.6 million barrels of crude oil, a new high record, and an increase of 35 per cent compared with the similar period in 1941.

All lines in March scored gains as compared with March 1941.

In the accompanying tabulation are shown deliveries by the nine carriers in March and for the first 3 months of this year with comparisons for similar periods in 1941, in thousands of barrels:

	March		3 months	
	1942	1941	1942	1941
Buckeye	8,877	6,732	25,687	19,758
Eureka	930	731	2,779	2,147
Illinois	7,966	5,546	23,489	15,573
Indiana	2,828	1,989	7,198	5,582
National Transit	1,707	1,461	4,901	4,392
N. Y. Transit	1,132	807	3,030	2,336
Northern	1,572	973	4,096	2,872
Southern	759	345	2,114	1,021
S. W. Penna.	1,174	1,064	3,581	3,036
Total	26,945	19,648	76,695	56,717
Daily average	869	634	853	630

Pipe-line transportation of motor fuel in January registered an increase from the corresponding months of 1941 and 1940 respectively, but was off slightly from December 1941, according to Bureau of Mines figures.

Motor fuel turned into lines in January totaled 10,122,000 bbl., against 10,142,000 bbl. in December; 8,816,000 bbl. in January, 1941, and 7,167,000 bbl. in January 1940.

Motor fuel delivered from lines in January totaled 9,151,000 bbl., against 9,530,000 bbl. in December; 7,683,000 bbl. in January 1941, and 6,366,000 bbl. in January 1940.

Stocks in lines and working tanks at the end of January totaled 7,294,000 bbl., against 6,358,000 bbl. a month earlier, and 6,193,000 bbl. a year earlier. At the end of January 1940, stocks in lines and working tanks totaled 5,932,000 bbl.

Empire Pipeline Co. Transfers Superintendents

With the promotion of Harry Nelson to the newly created position of general superintendent of Empire Pipeline Co., several changes have recently been made in this organization. P. O. Teeter becomes assistant to the general superintendent after being district superintendent in East Texas where he has been located for a number of years. Mr. Nelson and Mr. Teeter are now at the Bartlesville, Okla., office.

J. W. Fagan has been transferred from Ponca City, Okla., where he has been assistant district superintendent, to succeed Mr. Teeter in East Texas where he is now established in the Gladewater, Tex., office.

H. H. Hines has been moved from El Dorado, Kans., to Gladewater, Tex., where he has the position of assistant district superintendent.

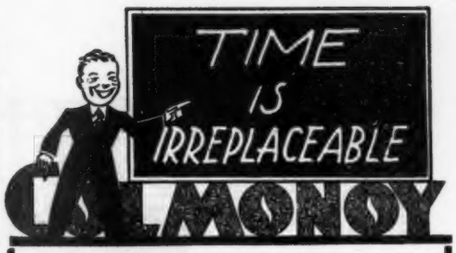
Navy Develops New Technique for Blimp Patrol of Tanker Routes

Measures taken by the Navy for combating submarines are significant for the whole industry because tanker sinkings affect all forms of petroleum transportation including pipe lines, tank cars and inland waterway barges.

Some of the methods adopted by the U. S. Navy for tracking down and sinking submarines off Cape Hatteras on the North Carolina coast are described in the latest issue of Shell Progress, by Ensign R. G. Pearson, U.S.N.R. The technique has been much improved since World War I.

The submarine moving slowly below the surface is spotted better by an airship moving slowly than by a speeding airplane which is forced to circle endlessly in thoroughly scanning any small section of water. When spotted or attacked, the submarine's only defense is to submerge and lie on the bottom of the ocean with its engines silent so that it cannot be traced by listening apparatus. Obviously the blimp enjoys an advantage over the airplane in its ability to hover motionless over the hiding submarine, patiently waiting with bombs held ready until the raider breaks the surface. It has an advantage over surface patrol ships through its ability to hover in midair out of danger of torpedoes.

On patrol duty it is ready to go to the rescue of surface vessels when radio distress signals are received; it notifies the Navy regarding enemy mine fields; and it hunts for enemy submarines and either destroys them itself or radios for help from Navy subchasers or planes. Presence of a submarine is revealed by meager clues such as an oil streak, eddies of muddy water, air bubbles, floating trash and the flight of sea gulls following a periscope out of curiosity. At night it may be traced by faint phosphorescent glow. If the submarine sees the airship and submerges, the airship simply lowers a listening device into the water and continues to trail it by the sound of its propellers.



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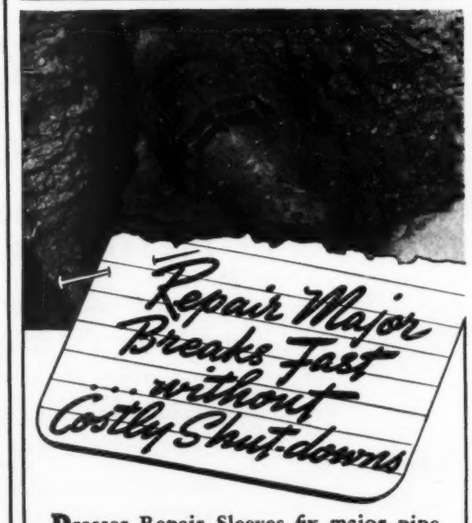

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FIELD DEVELOPMENTS...

HIGHLIGHTS FROM THE WEEK'S NEWS—

Drilling activity again showed a slight improvement with 325 completions, or 13 more than during the preceding week. A decrease of eight in the number of dry holes drilled is not significant unless continued during the next few weeks. Gas wells were up 10 and oil wells up 11. The small increases reported during the past 2 weeks are of little significance when contrasted with the much larger gains during the same period of last year. In the late spring of 1941 a drilling boom began which cumulated in a peak of over 700 wells a week. Under normal conditions, with no interruption of transportation, the same activity could have been expected this year.

Even though drilling is not increasing, there is considerable improvement in the discovery rate. This week, the outstanding discovery is in the Pauls Valley area of South Central Oklahoma. However, other areas are also showing promise. One of these is Bee County, Texas. Development of this section was stimulated by the discovery of oil in the Pettus and Cole sands at Pettus and other neighboring fields. The yield of later discoveries was much smaller than that of the original fields but hope has been held out that deeper pays would be found. Some relatively unimportant production was obtained from the Carrizo member of the Wilcox at West Tuleta but this formation appears to be about to pay off handsomely in the South Caesar area to the northwest.

Deep exploration on the flanks of salt domes also continues. These structures along with complexly faulted structures and shallow sands have been designated by OPC as the principal types upon which exceptions to M-68 would be authorized. With this encouragement for normal development, operators are going ahead with a program that started last year and which has met with conspicuous success.

The increase in activity caused by important discoveries in Michigan is continuing, after a brief pause, and the play is spreading still farther to the northwest. In this connection, it was suggested some years ago by Dr. R. B. Newcomb, then connected with the state Geological Survey, that the elongated glacial valleys in the northern part of the peninsula might be associated with structural features in the underlying rocks. Exploration is rapidly nearing the area in which these valleys are found and the theory may be tested during the next few months.

OKLAHOMA: Pure's discovery in the Wilcox near Pauls Valley, Garvin County, not only opens a new area of considerable size to production but also links such fields as Apache and Cement with lines of folding which can be traced westward from the Arbuckle Mountains (p. 94).

ILLINOIS: With the exception of two prospective pool openers, one in Jefferson County and the other in Edwards County, the sixth anniversary of the discovery of the Bartelso pool, which started the basin play, was uneventful (p. 98).

EAST TEXAS: Magnolia's discovery in the Woodbine sand in the Concord area, northeast Anderson County, is producing a heavy crude of about 16 gravity. The second well to the Nacatoch southwest of Pleasant Grove is reported running higher than the discovery (p. 95).

SOUTHWEST TEXAS: The Carrizo sand pay at South Caesar, Bee County, has been extended 7,000 ft. to the northwest. Gas-distillate production has been opened in the Hockleyensis zone west of Beeville. On the northwest edge of Ben Bolt, Jim Wells County, a shallow pay has been found and a new gas field has been opened northwest of Labbe, Duval County. Willamar and Washburn have been extended (p. 95).

MICHIGAN: Development is increasing in the south end of the Headquarters field, Roscommon County, as good wells are completed. The Lake County discovery, reported some weeks ago, is still averaging better than 100 bbl. after acidizing. This is the most northwesterly production in the state and has started several operations in the area (p. 101).

LOUISIANA GULF COAST: Deepest flank production yet encountered on the Leeville dome by filling a large gap on the southeast side indicates that the deep pays may completely encircle the structure (p. 92).

WYOMING: A good Tensleep sand discovery is reported in the old Pilot Butte field, Fremont County, and the Dakota sand is producing gas after a test on the Sherrard structure, Carbon County, was plugged back from the Tensleep (p. 99)

TEXAS GULF COAST: A new producing area south of the Ganado field is assured from the Frio. Wilcox production in the Camp Eleven field, Tyler County, has been defined to the northeast (p. 92).

ALBERTA: Tangible aid to wildcatting has been given by the Canadian Government which is allowing expenditures on a deep test to offset revenues on a producer for income tax purposes (p. 101).

KANSAS: Production being found in the Dayton field of Phillips County may provide the clue to the extension of the producing area along the Central Kansas uplift and the virgin territory of Southwest Nebraska (p. 91).

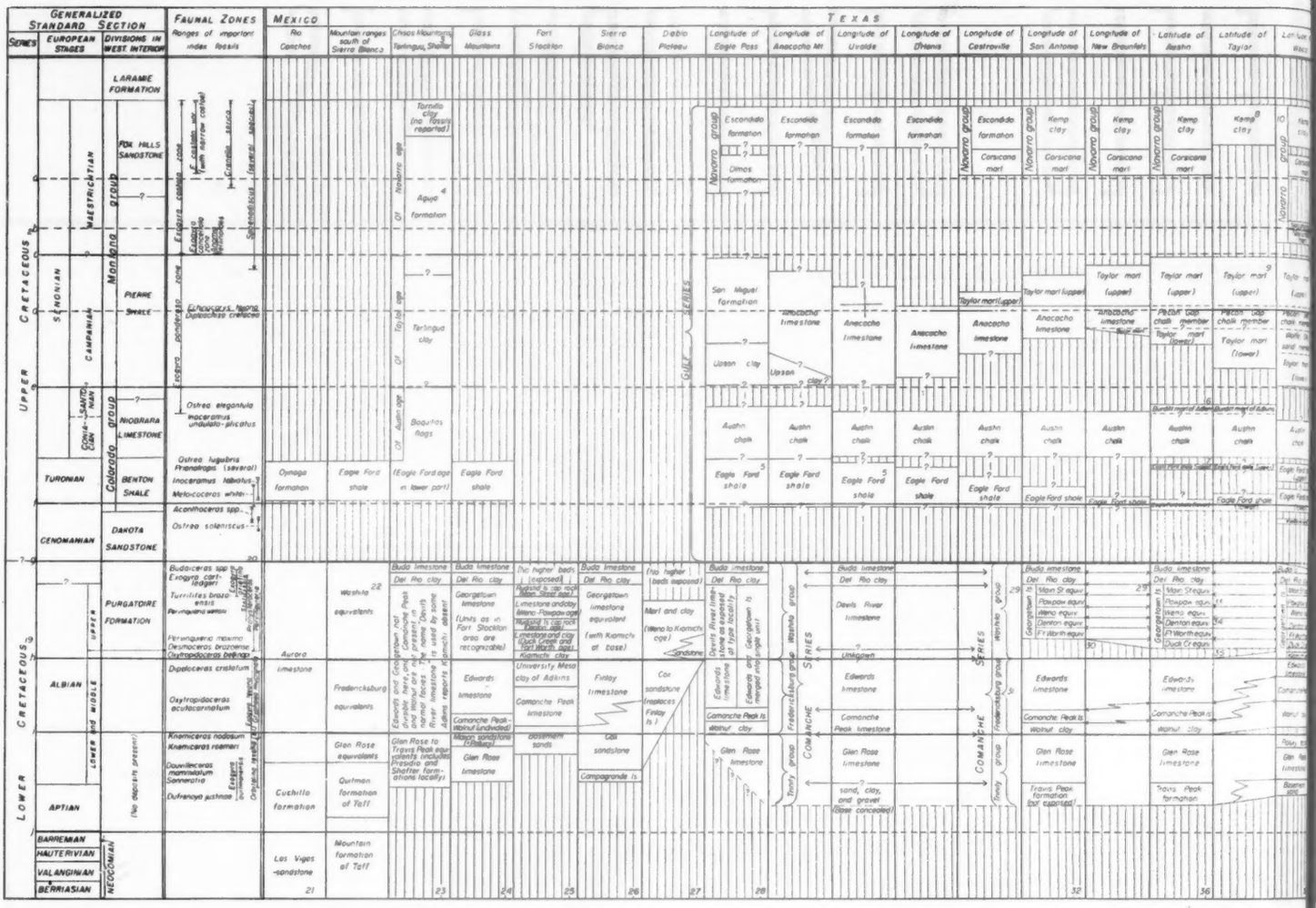
CALIFORNIA: Six wildcats in the San Joaquin Valley and two in the Aliso Canyon sector of the coastal district were abandoned. The Bowerbank gas field has been extended ¾ mile to the northwest (p. 90).

WEST TEXAS: The Fullerton area, Andrews County, had its second producer but a dry hole 1 mile west of the discovery limits production in that direction. A showing of oil is reported in the Clear Fork lime in Midland County which may result in the first oil in the county (p. 89).

COMPLETIONS IN ALL FIELDS . . .

(Week Ended April 18, 1942)

	Oil	Gas	Dry	Total	Footage	Tll. comp. to date 1942	Tll. comp. to date 1941
N. Y., Pa., and W. Va.	51	15	2	68	137,402	1,165	1 372
Ohio	4	7	8	19	42,360	289	425
Indiana	7	0	4	11	23,101	115	129
Kentucky	1	3	1	5	12,827	140	158
Illinois	8	0	12	20	55,745	528	832
Michigan	6	2	6	14	32,322	207	244
Kansas	7	0	11	18	57,889	466	489
Nebraska	2	0	2	4	7,530	16	25
Missouri, Iowa	0	0	0	0	0	6	2
Oklahoma	5	1	5	11	40,851	439	414
Texas:							
North Central Texas	12	0	8	20	51,437	445	774
West Texas	24	0	1	25	105,724	562	553
Texas Panhandle	5	0	0	5	15,775	166	152
East Texas	2	0	2	4	26,273	146	318
Texas Gulf Coast	14	1	6	21	141,171	288	296
Southwest Texas	14	4	11	29	147,415	456	464
Total Texas	71	5	28	104	487,795	2,063	2,557
North Louisiana	9	0	5	14	64,060	178	169
Louisiana Gulf Coast	5	0	1	6	59,135	189	232
Total Louisiana	14	0	6	20	123,195	367	401
Arkansas	1	0	0	1	3,443	41	51
Mississippi and Southeast	2	0	1	3	13,828	31	60
Montana	0	0	2	2	5,354	46	70
Wyoming	0	1	0	1	5,158	28	39
Colorado, Utah	0	0	0	0	0	4	10
New Mexico	5	0	1	6	17,617	77	85
California	9	2	7	18	115,156	267	310
Total United States	193	36	96	325	1,181,573	6,295	7,673
Total previous week	182	26	104	312			
Week ended Apr. 19, 1941	378	48	154	580			



Correlation of the outcropping Cretaceous formations of Tra

Cretaceous Formations of The South and Southwest

By W. V. HOWARD

The Committee on Stratigraphy of the National Research Council is presenting a series of 12 charts showing the classification and correlation of Paleozoic and later sedimentary formations of North America. These are to be published in full in the Bulletin of the Geological Society of America, from which reprints may be purchased separately or in sets.

That part of the chart showing correlation of the Cretaceous formations in the southern oil-producing states or those in which there is exploratory activity is republished in the hope that it will prove of value to operators. Pays are related to breaks in the section.

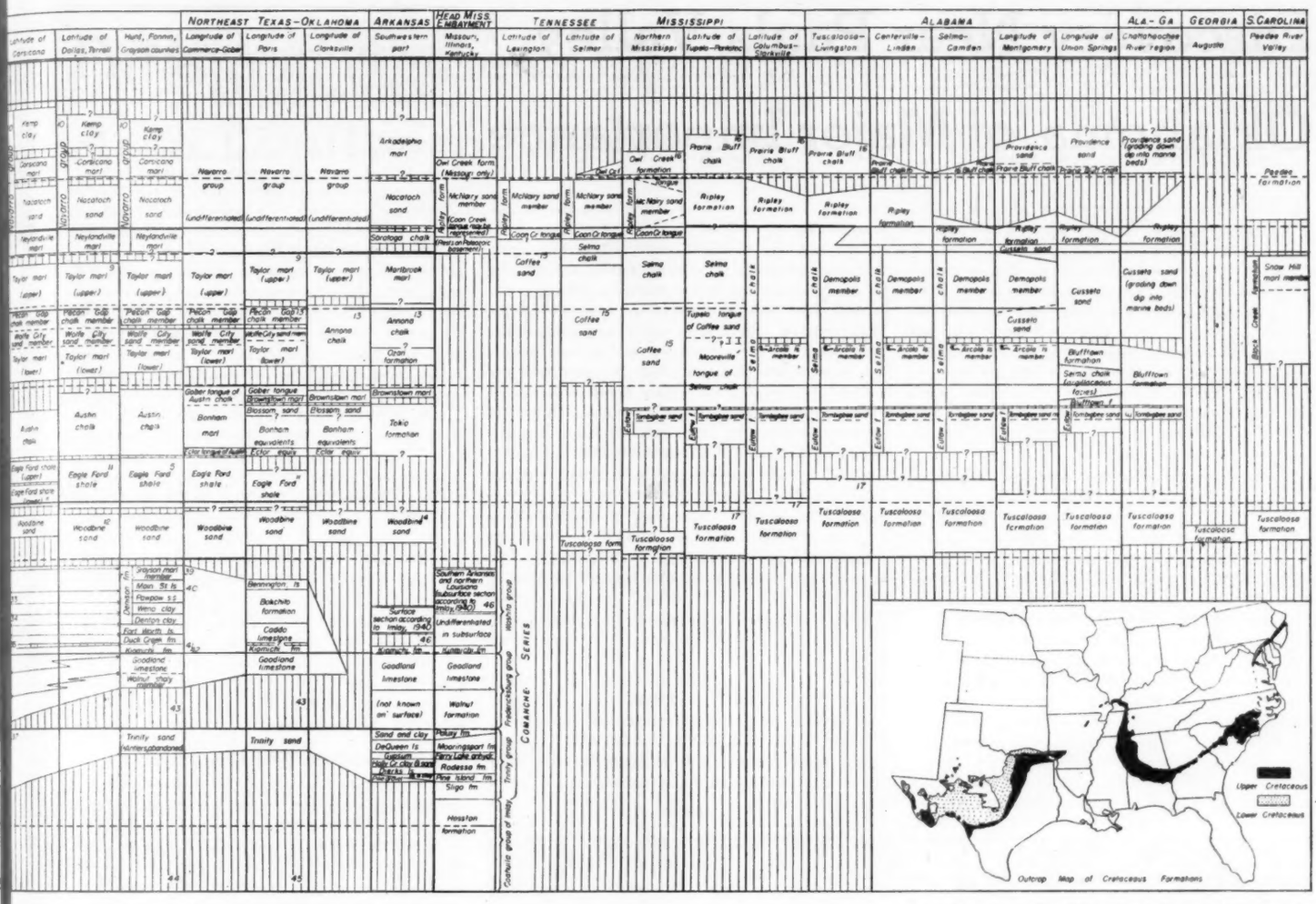
The authors of this correlation are Lloyd W. Stephenson, Philip B. King, Watson H. Monroe of the U. S. Geological Survey, and Ralph W. Imlay of the Arkansas Geological Survey.

CORRELATION charts showing the distribution of geological formations are of considerable value to the oil operator as well as to the professional geologist. These charts differ from well logs in that they do not show details from which structures may be mapped; that is, there is no correspondence between the vertical scale on the chart and the thickness of the formations represented. Correlations are based upon fossil contents mainly with some emphasis on lithological characteristics in the absence of fossils.

The first and most obvious fact presented on correlation charts is the nature and sequence of the formations that may be encountered. Cases are not unknown where wildcats have been drilled in search of certain formations which were actually higher than the point at which the well was started. More frequently, the formation sought is absent in the locality of the well.

The second important feature shown by the correlation chart is the gaps that occur in the section. These gaps, or unconformities, represent periods which may be either long or short during which the area was above sea level. This may be due to local folding or to more general movements which uplifted large areas above sea level.

During these periods of erosion, formations which are exposed are weathered and porosity may be developed or increased. The formations



ns-Pecos *Texas, the Gulf and South Atlantic Coastal Plain*

Reprinted from Bulletin Geological Society of America.

immediately below unconformities (shown by vertical lines on the charts) may thus form petroleum reservoirs.

An unconformity at one point which separates two sedimentary formations indicates that somewhere in the direction of the former sea there was a shore line and downdip from this shore line there are possibilities for wedging sands. These sands could form stratigraphic traps. Thus every gap in the section represents a period of recession of the sea with erosion of the newly exposed formations followed by a period of advance during which potential oil reserves are laid down over the old surface. Sometimes the sequence is more complicated with several retreats and advances, but this fact cannot be ascertained from the rocks exposed at the surface.

Value of Stratigraphic Correlations

Correlations of outcropping formations may therefore be compared with well logs which are drilled downdip. If, for example, a well is drilled somewhere south of Austin and the following sequence is logged — Austin chalk, shale, sand, Buda limestone—then comparison with the chart indicates that the sand is Woodbine. If it carries salt water, wells drilled updip nearer the pinchout may open up a new field. If another well is drilled, southeast of Clarksville and no Woodbine sand is found, that indicates that the well was drilled over an old uplift and that somewhere to the west the edge of the Woodbine will be found. When found it might produce a hole full of water, but it might also bring in East Texas.

In the accompanying charts the first break in the section is found at the top of the Paluxy sand, which is an important pay around the Sabine uplift in the Ark-La-Tex area. Other pays are found below the Paluxy in the Rodessa and Hosston formations, but as these have not yet been studied in sufficient detail the presence or absence of breaks is not known.

Above the break between the Paluxy sand and the Walnut clay the next unconformity is at the top of the Edwards limestone in the San Antonio-Austin area. East of Austin the Kiamichi clay is wedged in above the Edwards. In the area where the unconformity is present, the Edwards limestone carries oil in such fields as Luling, Salt Flat and Darst Creek. Where there is no unconformity the Edwards has not produced, and prospecting for oil in this formation carries far more than the normal element of risk.

The next gap is at the close of the Lower Cretaceous, or above the Buda limestone. In eastern Texas the Buda itself is cut out and the erosion surface goes lower in the section. Hence, if limestone production can be expected below an unconformity, the Buda should produce west of the longitude of Waco. Some small production has been found south and a little east of Waco in the Buda, but most Buda production lies to the southwest. The fact that it is small suggests that the Buda limestone does not erode in such a way as to give rise to much porosity or else that source materials were lacking in the Upper Cretaceous sea which overlapped the eroded surface. The unconformity above the Buda is particularly important in that the erosion period was divided into two parts in the eastern section by the advance of the sea during Woodbine and Tuscaloosa times and subsequent retreat. These formations are thus particularly valuable as potential reservoirs being wedge-edge deposits and also having been subjected to some erosion which may have increased their original porosity. The productivity of the Woodbine is too well known to require more than casual mention. The possible importance of the Tuscaloosa is suggested by production which has been obtained from it at Tinsley.

Upper Cretaceous Unconformities

The gap above and in the Eagle Ford is not of much importance as the formation itself is not one that forms reservoirs. Above this the breaks above the Blossom sand, the Austin chalk, the Wolfe City, the Annona chalk, the Marlbrock (Buck range) and the Nacatoch conform very closely to the areas in which these formations produce.

East of the Mississippi River the producing horizons are in the Selma and Eutaw, and their relations are not clear as this area has not been closely studied on outcrop, and insufficient wells have penetrated them to give a clear idea of subsurface conditions. The numerous sand sections at Tinsley, however, suggest that there are breaks in this series and that these breaks are occupied by wedging sands. The unconformities at the top of the Ripley and Prairie Bluff have no significance so far as our present knowledge of the oil of the area is concerned.

Discovery Near Pauls Valley, Oklahoma, of Major Importance

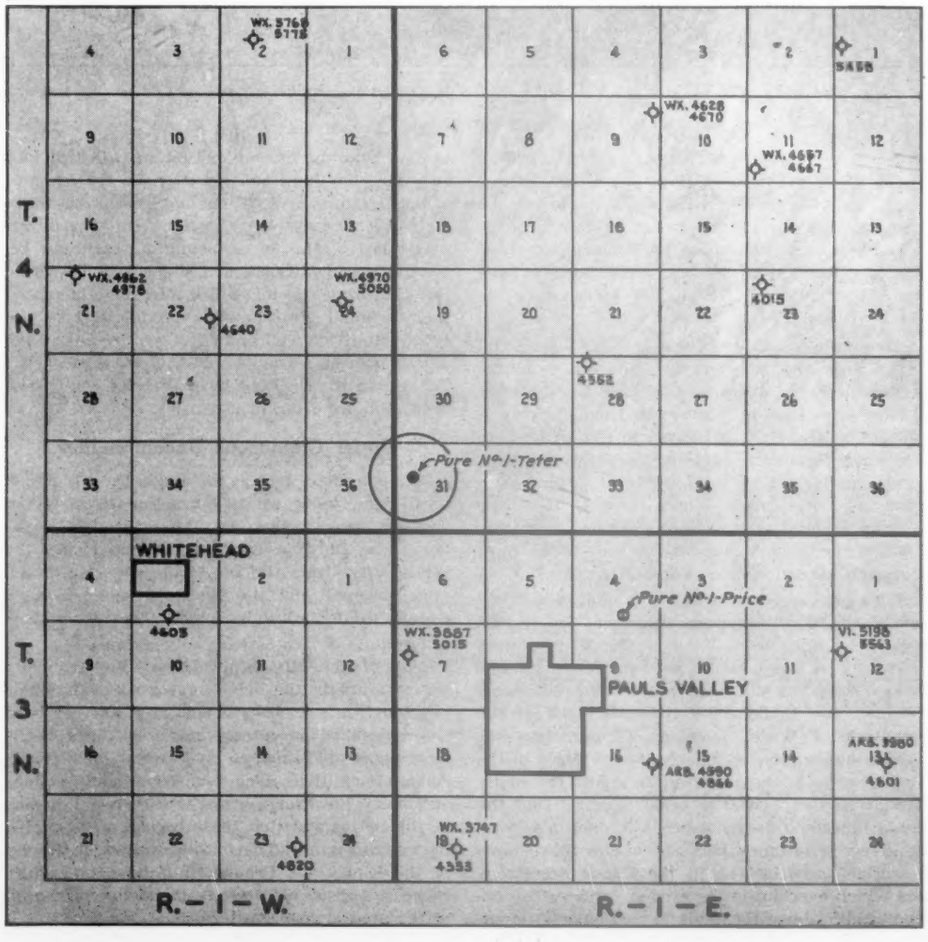
AFTER many deep tests had been drilled in eastern Garvin County over a period of years, efforts to find production on the northern flank of the Arbuckle Mountains were crowned with success when Pure 1 Teter, SE NW SW 31 4n-1e, made an average of 102 bbl. an hour on four 1-hour tests. The discovery found the top of the Checkerboard lime at 3,575 ft., or 2,682 ft. below sea level, and the top of the Simpson at 3,855 ft. Pay sand, tentatively correlated with the Wilcox was found at 3,900-06 ft. Gas, estimated at 3,500,000 cu. ft., accompanied the oil. Casing was set at 3,890 ft.

Before the Teter well was completed, Pure was already drilling below 2,600 ft. in their second test, 1 Price, SW SE 4-3n-1e. The location of this well shows the trend of the structure as determined by reflection seismograph, which is wholly responsible for the discovery. The structure is believed to be a long narrow anticline of the type usually associated with production in southern Oklahoma and is on strike with the truncated folds of the north edge of the Arbuckles where they are submerged below Pennsylvanian deposits in Pontotoc County. This trend may be further continued to the Ohio 1 Feaster, NW NW SE 13-3-1, which was drilled to the Arbuckle last year without finding production.

Pure's discovery ranks in importance with Cumberland and Apache in establishing the area flanking the Arbuckle-Wichita-Amarillo mountain folding as one of the most favorable areas for prospecting in the country. The folding in this area began in the Lower Paleozoic and continued through the Pennsylvanian although the greater part was concluded by the end of the Mississippian. There is thus a strong unconformity below the Pennsylvanian and where folding has thrown the Simpson high beneath this unconformity, there is a strong possibility of production. The test is the third deep well drilled by Pure in the area and credit for the discovery is due to Ira H. Cram, assistant chief geologist, whose faith in the area was not shaken by the two failures.

The Cement field, which lies in the same general trend and which is on a line of folding parallel to that at Pauls Valley, proves that there is also Pennsylvanian production in the area as there are a number of oil and gas pays in this field in which Ohio 6 Preston-Culp was drilled to below 10,000 ft. without leaving Pennsylvanian beds.

The folding associated with the Arbuckle-Wichita-Amarillo uplifts is now known to carry production on structure within a belt 90 miles wide, between Pauls Valley and the Cooke County, Texas, fields. Production extends for 168 miles along the strike of the folds, from Cumberland to Fargo and Altus.



Geology May Afford Link in Good Neighbor Policy

(Continued from Page 45)

repeat itself and that private industry will again come to the fore. American companies have already acquired wide experience in the mineral producing industries in Latin America. This experience can be made to serve the purposes of the Good Neighbor Policy and its utilization will be of inestimable value in advancing the Good Neighbor Policy. Government will learn that private capital can conform and will gladly conform its plans and operations to the needs and best interests of the "commonwealth" of the Western Hemisphere. American oil companies in particular can be useful to government in carrying out the Good Neighbor Policy. It is no mere accident that American private enterprise has found so large a part of the world's oil in the past. The achievement is the direct result of a team work between science and industry so closely coordinated that the very workman himself has absorbed the geologic principles that guide the search for oil. The necessary research has become part and parcel of the producing operation. In the American method of oil-finding the scientist is a workman and the workman becomes a scientist. Science and industry are literally one. The technique is peculiarly American, born of free enterprise and the dignity of labor. It is not fully attainable in a society that denies to the educated man the privilege of common labor.

Need for Real Cooperation

If the greatest success is to attend our efforts to develop the mineral resources of Latin America, therefore, it is imperative that we set forth in those countries as we have learned to do in our search for oil in our own country with scientist and workman shoulder to shoulder in a common endeavor. This intimate relationship of science and industry is not readily achieved through the mechanism of bureaus or commissions. Supervision and scientific guidance by detached corps of government experts are often handicapped by rigidity, delays and faulty understanding. Private enterprise can make itself more flexible, can be absorbed more completely into the routine operation, and can attain an efficiency and esprit de corps difficult of achievement through official channels. An individual staff of scientists and engineers for each undertaking, men who are free to make their own decisions and who are responsible for their own success or failure; an organization of this character seems more likely to succeed in the exploration and development of new mineral resources in Latin America, than any government-financed and government-directed operation.

Under these circumstances it is safe to predict that free enterprise, as exemplified by the American oil-producing industry, will ultimately be called upon, under regulations that will safeguard the national interests of our Latin American neighbors, to play a leading part in finding and developing the new oil fields in tropical America, upon which the Western Hemisphere must come in time to rely for its supplies of liquid fuels and lubricants.

References

1. Peace With Empire, Survey Graphic, New York, xxx, 3, Mar. 1941.
2. Nelson A. Rockefeller, coordinator of commercial and cultural relations between the American Republics, "Progress Toward Economic Solidarity," address before Economic Club, Chicago, May 7, 1941.
3. The Rio conference, John D. Leonard, Wall Street Journal, New York, Jan. 8, 1942.
4. Minerals Yearbook, Review of 1940, p. 670, U. S. Department of Interior, Washington D. C. (1941).

Fullerton, Andrews County, Area Limited to Northwest

By ROBERT INGRAM

MIDLAND, Tex.—A second producer for the deep Fullerton-Wilson area of northwest Andrews County was brought in last week, but an outpost 1 mile west of production was shut down for orders after going to sulfur water. It apparently marked the limit of the pool in that direction. The new well was Fullerton Oil Co. 2 Wilson, Section 15, Block A-32, P.S.L. Survey, west offset to the discovery.

It was drilled to 7,226 ft. in lime and then tubing was run with packer set at 7,106 ft. After being treated with 3,400 gal. of acid, the well began flowing at the rate of 43 bbl. of 39.5-gravity oil an hour through 2-in. tubing with gas-oil ratio of 640:1.

The new well was being completed at higher levels than the discovery, Fullerton 1 Wilson. The 1 Wilson was drilled to 8,000 ft. and then plugged back to 7,280 ft. where it rated a potential of 707 bbl. of oil daily after treatment with 8,000 gal. of acid.

A mile west of the discovery, meantime, Magnolia 1 Ralph, Section 11, Block 37, P.S.L. Survey, recovered 180 ft. of mud cut slightly with oil and gas and 2,250 ft. of sulfur water on a 2-hour drill-stem test at 7,361-7,403 ft., total depth. Also, on the eight preceding drill-stem tests, the outpost showed nothing to indicate production. Work was halted at week's end, but in light of what the 2 Wilson did after acid treatment, it was thought that an attempt might be made to plug off the water and acidize.

A third test in the area, Fullerton 3 Wilson, Section 15, Block A-32, north offset to the discovery, was drilling below 6,640 ft., still short of the pay horizon.

Wildcat Running High

Thirteen miles west of the Fullerton area in Andrews County (see above), Humble Oil & Refining Co. 1 Sims, Section 24, Block A-29, P.S.L. Survey, was drilling below 1,954 ft. in salt and anhydrite, with driller's top for the anhydrite at 1,625 ft. From an elevation of 3,495 ft., this top gives the anhydrite a datum point of 1,870 ft. as compares to 1,692 ft. in the Fullerton discovery.

Gas Showing in Outpost

Phillips Petroleum Co. 1-A University-Andrews, Section 30, Block 10, University Survey, 1½ miles north of the discovery gasser in the West Andrews pool, was drilling below 7,075 ft. after reporting shows of oil and gas and sulfur water on four drill-stem tests.

On the first test from 6,215-55 ft., with tool open 1 hour, there was a flow of 3,000,000 cu. ft. of gas and a spray of oil. Second test from 6,200-40 ft., also open 1 hour, recovered 1,100 ft. of oil cut mud and 10,000 cu. ft. of gas. The third test, run from 6,386-6,450 ft., also was for 1 hour and recovered 750 ft. of gas-cut mud with a slight show of oil. Gas increased from 20,000 cu. ft. to 8,000,000 cu. ft. Final test was from 6,750-6,835 ft. Recovery at that depth was 2,100 ft. of sulfur water in 1 hour.

Prospects for oil production in Midland County, well to the east of the present producing trend in the Permian basin, improved last week with a show of oil in Broderick & Caivert, Inc., and George P. Livermore, Inc., 1 Billy Bryant, Section 24, Block 39, T-3-S, T.&P. Survey. There is no production in the county at present, although many of the firms operating in West Texas have headquarters at the town of Midland, 13 miles to the north.

The present test was cored from 5,589-94 ft. with 4-ft. recovery with the last foot of lime well saturated and porous, showing live oil. The first foot of the core was shaley lime, and the second and third feet porous lime carrying oil.

Operators at once started coring ahead, and indicated they would halt to set pipe if the second core should appear as promising as the first.

The show has been tentatively classified as in the Clear Fork series, top of which was called at 5,230 ft. Elevation is 2,699 ft. The test has shown thinning of section and is believed to be running several hundred feet higher regionally. It is located on a block of 14,000 acres almost solid.

As the core was being pulled, it was reported that a 6,000-ft. operation was scheduled to start about the middle of May in extreme northwestern Midland County. It would be Price Drilling Co.'s well in SE Section 29, Block 40, T-3-S, T.&P. Survey, west and north of the town of Midland.

NORTHERN WEST TEXAS COMPLETIONS

Fields

Sharon Ridge, Scurry County: R. J. Byrd 2 Wade, elev. 2,285 ft., pumped 172 bbl., shot, pay 2,238 ft., T.D. 2,460 ft.

Slaughter, Cochran County: Honolulu 7-58 Dean, 560 ft. from N and E lines of lease, Lge. 58, Martin C.S.L. Sur., flowed 677 bbl. through 2½-in. casing after acid, pay 4,923 ft., T.D. 4,990 ft.

Honolulu 36-7 Igoe and Smith, elev. 3,665 ft., flowed 1,229 bbl. through 2½-in. casing outlet after acid, pay 4,952 ft., T.D. 5,039 ft.

Honolulu 39-15 Igoe and Smith, 560 ft. from S and E lines, Labor 15, flowed 687 bbl. through 2½-in. casing outlet after acid, pay 5,018 ft., T.D. 5,050 ft.

Slaughter, Hockley County: Honolulu 15 Frazier, elev. 3,501 ft., junked, lost hole, air 2,493 ft., increased air 2,565 ft., T.D. 2,880 ft.

Honolulu 15-A Mallett, 560 ft. from N and E lines, Labor 20, elev. 3,557 ft., flowed 1,407 bbl. through 2½-in. casing outlet after acid, pay 4,950 ft., T.D. 5,015 ft.

Magnolia 16-E Mallett, 580 ft. from N and W lines, Labor 11, Lge. 49, Scurry C.S.L. Sur., flowed 1,203 bbl. through 3-in. casing outlet after acid, pay 4,940 ft., T.D. 5,010 ft.

Magnolia 17-F Mallett, 580 ft. from N and E lines, Labor 8, Lge. 49, Edwards C.S.L. Sur., elev. 3,601 ft., flowed 1,720 bbl. through 3-in. casing outlet after acid, pay 4,970 ft., T.D. 5,020 ft.

Clifford Mooers (formerly Shasta Oil Co.) 1 R. D. Glimp, elev. 3,550 ft., flowed 1,976 bbl. through casing outlet after acid, pay 5,002 ft., T.D. 5,034 ft.

Texas 19-B Mallett, elev. 3,573 ft., flowed 403 bbl. through casing outlet after acid, pay 4,985 ft., T.D. 5,022 ft.

Texas 20-B Mallett, elev. 3,580 ft., flowed 1,202 bbl. through casing outlet after acid, pay 4,970 ft., T.D. 5,020 ft.

Texas 93 Slaughter, elev. 3,529 ft., pumped 246 bbl. oil plus 9 per cent water, acid, pay 4,970 ft., T.D. 5,030 ft., P.B. 5,000 ft.

Texas 127 Slaughter, elev. 3,556 ft., flowed 1,039 bbl. oil plus 2 per cent water through casing outlet after acid, pay 4,982 ft., T.D. 5,026 ft.

Crockett County Test

Sun Oil Co. 1 Shannon, 660 ft. out of the southwest corner of the west 1,427 acres of the north 2,227 acres of League 1, Archer C.S.L. Survey, 1¾ miles north and west of the one-well Olson pool and 4 miles south of the Noelke field, had a show of oil last week after orders had been given for abandonment.

Abandonment had been ordered early in the week after a hole full of sulfur water had been logged from 2,085-89 ft., total depth, with a slight showing of oil at 2,085 ft. When a bailer was run preparatory to plugging, however, 1,000 ft. of fluid rose in the hole. It was then thought possible that the water was found in the last foot of the lime and that the oil was coming from above that point. In this event efforts likely will be made to plug off the water and test the oil-bearing zone.

SOUTHERN WEST TEXAS COMPLETIONS

Fields

Abell Ordovician, Pecos County: G. T. Abell 1 R. D. Blaydes, Sec. 5, Blk. 3, H.&T.C. Sur., elev. 2,392 ft., flowed 666 bbl. oil plus 5 per cent water through ½-in. tubing choke natural, pay 5,281 ft., Simpson 4,910 ft., Tulip Creek 5,070 ft., T.D. 5,301 ft., ¼ *mile south of production.*

Apco-Warner, Pecos County: Childress 1-C J. S. Masterson, elev. 2,437 ft., flowed 358 bbl. through 7/32-in. choke, acid, Ellenburger 4,430 ft., pay 4,555 ft., T.D. 4,700 ft.

Hendrick, Winkler County: Sinclair Prairie 9-A Fred Leck, 330 ft. from S line and 1,650 ft. from E line Sec. 33, Blk. 74, P.S.L. Sur., elev. 2,871 ft., flowed 687 bbl. through ½-in. choke, natural, pay 3,050 ft., T.D. 3,090 ft.

Johnson, Ector County: George P. Livermore 3-40 Johnson, flowed 48 bbl. through tubing, shot, pay 4,128 ft., T.D. 4,166 ft.

North American Oil 4 Johnson, 2,310 ft. from S and E lines Sec. 46, Blk. 43, Twp. 1s, T.&P. Sur., elev. 2,993 ft., flowed 1,038 bbl. through ¾-in. tubing choke, shot, pay 4,085 ft., T.D. 4,140 ft.

Kermit, Winkler County: Ralph Lowe 2 Brown-Altman, elev. 2,825 ft., flowed 192 bbl. through tubing, shot, pay 3,038 ft., T.D. 3,190 ft.

Keystone Colby, Winkler County: Standard Oil of Texas 62-13 Baird, elev. 2,929 ft., flowed 284 bbl. through casing, shot, pay 3,200 ft., T.D. 3,351 ft.

Standard Oil of Texas 52-18 Baird, elev. 2,908 ft., flowed 92 bbl. through casing, shot, pay 3,170 ft., T.D. 3,305 ft.

Keystone lime, Winkler County: Richardson & Bass 2 Ben Jenkins, elev. 2,975 ft., flowed 240 bbl. through 1-in. tubing choke after acid, pay 3,300 ft., T.D. 3,425 ft.

Richardson & Bass 4-A Ben Jenkins et al, elev. 2,979 ft., flowed 292 bbl. through 1-in. tubing choke, pay 3,333 ft., T.D. 3,490 ft.

North Cowden, Ector County: Stanolind and Magnolia 8 Holt, elev. 3,075 ft., flowed 903 bbl. through tubing, shot, pay 4,520 ft., T.D. 4,820 ft.

White & Baker, Pecos County: Cardinal Oil 8-J White & Baker, elev. 3,055 ft., pumped 64 bbl. oil and 68 bbl. water, shot, pay 2,126 ft., T.D. 2,150 ft.

TEXAS PANHANDLE

AMARILLO, Tex.—Last week's drilling activities in the Panhandle were about on a par with those of the previous week, with six locations and five wells completed, compared with the same number of locations and four completions the week before.

TEXAS PANHANDLE COMPLETIONS

Gray County: Pan Oil Co. A-6 Baer, Sec 126, Blk. 3, I.&G.N. Sur., pumped 182 bbl., pay 3,240-85 ft., shot.

Hutchinson County: Continental Oil Co. 2-A Sanford, Sec. 77, Blk. 46, H.&T.C. Sur., pumped 249 bbl. natural, pay 2,817-39 ft.

Stekoll Oil 2-C North Whittenburg, Sec. 37, Blk. M-23, T.C.R.R. Sur., pumped 44 bbl. natural, pay 2,920-3,105 ft.

Sinclair Prairie 1 Harrison, Sec. 14, Blk. M-16, A.B.&M. Sur., pumped 31 bbl. in 2½ hr., pay 3,157-96 ft., shot.

Moore County: Shamrock Oil & Gas 1-A McKee, Sec. 399, Blk. 44, H.&T.C. Sur., pumped 27 bbl. oil, 24,200,000 cu. ft. gas, pay 3,345-50 ft., gas 2,800-3,100 ft., T.D. 3,350 ft.

SOUTHEAST NEW MEXICO

HOBBS, N. M.—Phillips Petroleum Co. has staked a ¾-mile extension to the Maljamar pool in Lea County. The well is 1 Lea-Mex and is 660 ft. from the southwest corner of 19-17-33. Drilling is scheduled to start shortly. Same company completed its 1 Philmex, a wildcat between the Maljamar and Vacuum pools in Lea County.

SOUTHEAST NEW MEXICO COMPLETIONS

Wildcat, Lea County: Phillips 1 Philmex, NW NW 28-17-33, pumped 25 bbl., top pay 4,582 ft., T.D. 4,771 ft., P.B. 4,600 ft., acidized and shot.

Grayburg, Eddy County: Sanders Bros. 2-E Leonard, 33-16-30, flowed 282 bbl., pay 2,725 ft., T.D. 2,965 ft., shot.

Sanders Bros. 3-E Leonard, 34-16-30, flowed 165 bbl., pay 2,725 ft., T.D. 3,012 ft., shot.

Grayburg-Jackson, Eddy County: A. S. Wooley 1-H McEntyre, 3-17-30, flowed 180 bbl., pay 2,853 ft., T.D. 2,972 ft., shot.

A. S. Wooley 2-H McEntyre, 3-17-30, flowed 108 bbl., pay 2,981 ft., T.D. 2,997 ft., shot.

Red Lakes, Eddy County: Herbert Aid 2 Wentz-State, 24-17-28, dry, T.D. 900 ft.

CALIFORNIA FIELD REPORT

Curtailment Under OPC Orders Helps Conservation Movement

By L. P. STOCKMAN

LOS ANGELES, Calif. — A substantial improvement has taken place in California conservation work during the past several weeks due to curtailment so that actual production is closely approximating established quotas. Recent developments indicate a further improvement can be expected next month by which time all the chronic offenders are expected to be in line. The petroleum coordinator recently advised the Production Committee for District 5 not to issue or assign any monthly quotas to operators who are not complying with the present conservation program. In compliance with this order, monthly quotas for April were not issued to those who have not conformed with previous instructions issued by the Production Committee. The petroleum coordinator will be duly advised and unless existing offenders notify the Production Committee that they will comply with future orders they will be put on the spot. Orders will subsequently be issued against all offenders and all avenues will be shut so that it will be impossible for any refiner to process illegal oil or any carrier to move such production or any product derived therefrom.

Outlook Improved by Operation of New Plan

There has been a decided improvement in the general outlook during the past several weeks and the weakening that took place in the spot market for crude oil will probably be eliminated within the next few weeks. Under the new plan of fixing quotas based on the demand for certain products there should not be any excess production of crude oil and refiners who do not have the kind and quality of crude oil required will be forced to go out into the market and buy it. In other words, the present program is based on the assumption that certain types of crude will yield certain products and no emphasis is being placed on who has that type of oil. If the Production Committee allocates a certain amount of heavy crude-oil production it will be up to refiners to secure that type of crude if they need it.

Under the old method of allocating crude oil under a uniform method it was impossible to harmonize production with demand but under the present method the demand for refined products is the governing factor and production is tied into refined-oil demand. Then, too, the lifting of restrictions in settled fields has simplified conservation work to a large extent if the petroleum coordinator issues monthly quotas early enough in the future the present plan will be within striking distance of the primary objective which is the supplying of vital oil products for the war effort. The present outlook as far as production is concerned looks quite promising but marketers are taking a terrible licking trying to supply refined oil to areas by railroad and tank truck. Freight rates to the Pacific Northwest in some cases greatly exceed the selling price of the product. No company is escaping and it is estimated that California marketing companies are losing at least $250,000 each per month and have been for some time. The freight rate to Portland, Ore., for a barrel of fuel oil is $1.70, whereas the selling price is $1.10 per barrel. In other words, it costs $2.80 per barrel to lay down a barrel of fuel oil in Portland and with prices pegged the marketer can only charge $1.10 per barrel. The rate to Seattle, Wash., and other northwestern points varies accordingly.

Six Wildcats Abandoned In San Joaquin Valley

Operators in the San Joaquin Valley had a big week in the past 7-day period and made up for some of the small unsatisfactory weeks during the past month by completing seven oil wells, two gas wells, and abandoning six wildcats. The abandonment of six wildcat wells is the most interesting feature in connection with work as this means 30,000 ft. of unproductive hole drilled in search of new production. Prospectors are not losing much time in drilling and completing wildcats and for the past several months wildcat mortality has been quite high. It is now customary to wash out a wildcat as early as possible and then move to a new location with a minimum of delay. This indicates the desire of operators to find new accumulations and also reveals the fact that drilling crews are not any too plentiful. A large number of former drillers and crew men have gone into the shipyards and other defense work. The petroleum coordinator will very soon be able to remove any restrictions on drilling because there are not enough crews available to start many new wells. It will be found too, that if a decision is reached to drill additional wells in fields producing heavy crude oil, considerable difficulty will be experienced in getting drilling crews.

Bowerbank Gas Field Extended to Northwest

Texas Co. completed another gas well in the Bowerbank gas field of Kern County and in doing so extended the productive limits of the field about ¾ mile to the northwest. The company's new extension well was 9-C Root in 9-29s-24e and its completion now gives the field a length of almost 3 miles. Offsetting this satisfactory completion, Texas Co. abandoned 24-C Bowerbank in 24-29s-24e, and abandonment of this well limits the productive area to the east and southeast. The outer limits in all other directions are still undefined and may not be conclusively determined for some time due to provisions of M-68 which restrict the drilling of gas wells to one well to each 640 acres. Very little information has been released by Texas Co. about the Bowerbank gas field but judging by the results of drilling this field should exceed the ultimate production of the Buttonwillow gas field which was discovered a number of years ago by Milham Exploration Co. now operating as Seaboard Oil Corp. Two productive zones have been proved up by Texas Co. in the Bowerbank gas field and there is a possibility that a third may prove productive on top of the structure. To date, Texas has finished three gas wells but none has gone on production due to the lack of pipe-line facilities. The wells are blown out and after being tested are shut in. It is quite likely that Southern California Gas Co. will make pipe-line connections with the field in the near future and at any rate connections will be made before the advent of next winter. Texas Co. has enjoyed good success with its wildcat exploration in the Bowerbank gas field and this is more impressive because another operator drilled in this district and abandoned work when it failed to develop commercial oil production. Texas Co. later went back into this abandoned well and successfully completed it as a good gas producer. Some operators have always believed that the Salisbury wildcat that was abandoned as a dry hole in this region could have been made into a good gas well if an attempt had been made to do so. All wildcats drilled in this area in search of oil production before the advent of Texas Co. into the district were carried down well below 10,000 ft.

SAN JOAQUIN VALLEY COMPLETIONS

Bowerbank, Kern County: Texas Co. 9-C Root, 9-29s-24e, flowed 7,500,000 cu. ft. gas, 16/64-in. bean, flow pressure 1,650 lb., T.D. 4,940 ft., P.B. 4,475 ft., perf. eighty ⅜-in. holes in 5½-in. casing 3,973-93 ft., completed in second Bowerbank zone.

Texas Co. 24-C Bowerbank, 24-39s-24e, dry, T.D. 4,950 ft., form. test 4,760-80 ft., recovered salt water, redrilled from 2,200 ft. to 3,370 ft., form. test 3,334-70 ft. recovered muddy salt water, Mulinia zone 4,751 ft.

Coalinga Northeast, Fresno County: Standard Oil Co. 64-13-C fee, 13-20s-15e, flowed 3,928 bbl., 30.8-gravity, 0.5 per cent cut, 2,434,000 cu. ft. gas, 48/64-in. bean, flow pressure 735 lb., T.D. 7,200 ft., 60-mesh perf. 6,941-7,180 ft., Kreyenhagen 5,670 ft., green sand 6,796 ft., Gatchell oil sand of Eocene age 6,945-7,170 ft., bottomed in Gatchell silt.

Delano wildcat district, Kern County: Shell Oil Co., Inc., 1 Curry, 20-25s-26e, abandoned in basement granite, T.D. 7,250 ft., Oicese 4,475 ft., form. test 6,288-6,315 ft. recovered 3,700 ft. muddy water and sand, bottomed in granite 7,202-50 ft.

Elk Hills, Kern County: Standard Oil Co. 45-19-S fee, 19-30s-24e, flowed 450 bbl., 25.8-gravity, 1 per cent cut, 550,000 cu. ft. gas, 30/64-in. bean, T.D. 11,177 ft., P.B. 4,580 ft., completed in lower zone of Pliocene age.

Greeley, Kern County: Standard Oil Co. 11-30 Kern County Land, 17-29s-26e, flowed 2,202 bbl., 35.7-gravity, 0.5 per cent cut, 2,450,000 cu. ft. gas, 36/64-in. to 30/64-in. bean, flow pressure 1,020 lb., T.D. 11,510 ft., perf. 11,412-11,509 ft., completed in Rio Bravo zone 11,380 ft. and Vedder zone 11,421 ft., both of Miocene age.

Helm, Fresno County: Amerada Petroleum Corp. 75-28 Clover, 28-16-17e, flowed 178 bbl., 40.3-gravity, 0.2 per cent cut, 3,557,000 cu. ft. gas, 14/64-in. bean, flow pressure 800 lb., T.D. 8,110 ft., P.B. 8,093 ft., completed in Clover zone of Miocene age.

Jasmine wildcat district, Kern County: Termo Co. 1 Parker, 12-25s-27e, abandoned in barren Walker zone, T.D. 1,645 ft., grit zone 1,645 ft., Vedder zone of Miocene age absent.

Kern River, Kern County: Seaboard Oil Corp. 1 Fuhrman, 28-28s-28e, dry, T.D. 5,261 ft., upper Vedder of Miocene age 3,878 ft. wet, lower Vedder 4,119 ft. very tight and weathered granite 5,187 ft., form. test 4,118-38 ft. recovered 90 ft. mud and no oil.

Kettleman North Dome, Kings County: Standard Oil Co. 23-35-Q fee, 35-22s-18e, flowed 197 bbl., 40.7-gravity, 1.5 per cent cut, T.D. 7,432 ft., perf. 6,821-6,913 ft., 7,019-98 ft., and 7,239-7,430 ft., completed in Temblor oil sand of Miocene age.

Mount Poso, Kern County: General Petroleum Corp. 38 Heisen, 16-27s-28e, pumped 145 bbl., 15.1-gravity, 2 per cent cut, T.D. 1,942 ft., 80-mesh perf. 1,904-41 ft., completed in Vedder zone of Miocene age.

Paloma, Kern County: Western Gulf Oil Co. 12-7 Symons, 7-32s-27e, flowed 42 bbl., 50-gravity, 0.3 per cent cut, 457,000 cu. ft. gas, 32/64-in. bean, flow pressure 1,120 lb., T.D. 11,811 ft., production coming from perforated interval opposite Symons sand 10,935-85 ft., lower portion of hole opposite Paloma sand wet, top Miocene 10,775 ft., Paloma sand 11,270-11,547 ft.

Pixley wildcat district, Tulare County: Continental Oil Co. 5-9 Pixley Community, 9-23s-25e, abandoned in granite basement, T.D. 7,906 ft., no showings, granite 7,891-7,906 ft.

Rio Vista, Sacramento County: Amerada Petroleum Corp. 1 Anderson, 19-3n-3e, flowed 1,500,000 cu. ft. gas, 16/64-in. bean, pressures 1,300/1,175 lb., T.D. 4,398 ft., completed in Emigh gas zone of Cretaceous age.

Wheeler Ridge wildcat district, Kern County: Richfield Oil Corp. 3 Kern County Land, 36-11n-20w, dry, T.D. 6,291 ft., cored oil sand 5,010-89 ft., form. test 5,010-89 ft. recovered 180 ft. gas-cut mud but no oil.

Aliso Canyon Outposts Are Abandoned

Developments in the coastal district were not any too encouraging this week and it looks like attempts to extend or prove up additional structures in the Aliso Canyon district of western Los Angeles County have been doomed to failure. Tide Water Associated Oil Co. has abandoned 1 Mission in 26-3n-16w, as a duster at 9,291 ft. and Uni-

(Continued on Page 97)

Dayton Pool Development May Extend Play Into Nebraska

By CARL HOOT

ONE new Lansing-Kansas City well was added and another had good showings in the Dayton pool of Phillips County the past week. The two wells, owned by Carter Oil Co., are on a hypothetical trend that may extend production on the Central Kansas uplift into southwestern Nebraska. No. 2 Gerber, SW NW 36-2-19w, was drilled to 3,348 ft., set casing and perforated from 3,130-43 ft. In 4 hours it swabbed 149 bbl. of oil. All zones were acidized with 10,000 gal. The other well, 2 Dusin, SW SE 25-2-19w, was testing after a show of oil was found at 3,333 ft. Casing was ripped from 3,333-62 ft., total depth; and the well was acidized with 3,000 gal.

The Burnett pool of Ellis County was extended ½ mile to the west by H. Gussman 1 Lynn, NE SE SE 14-11-18w. Arbuckle lime was found at 3,554 ft. and on test the well made 1,451 bbl. of oil in 24 hours.

KANSAS COMPLETIONS

Wildcats

Barton County, 2 mi. S of Silica pool: Vickers Pet. 1 Metz, N½ NE NW 33-20-11w, dry, T.D. 3,375 ft., Lansing 3,114 ft., Arbuckle 3,370 ft., show dead oil.

Chase County: Leader Oil 1 Breese, SW SE NE 35-19-7, dry, T.D. 1,940 ft. in pink granite.

Cowley County: Fred Koch 1 Martin, W½ NW NE 17-31-4, dry, T.D. 3,382 ft., Kansas City 2,375 ft., Mississippi lime 2,986 ft., base Mississippi 3,290 ft., Arbuckle 3,370 ft.

Harper County: H. M. Williams 1 Lahman, NW SW 1-34-6w, dry, T.D. 5,127 ft., Kansas City 3,763 ft., soft and strong odor 3,771-73 ft., Mississippi lime 4,433 ft., Arbuckle 5,099 ft.

Leavenworth County: O. J. Connell 1 Hopkins, NW SE 1-12-20, dry, T.D. 1,260 ft., Mississippi lime 1,220 ft. O. J. Connell 1 Hemphill, NW SE 14-12-20, dry, T.D. 1,252 ft., Mississippi lime 1,217 ft.

Reno County, N of the new Schweizer pool: Appleman and Frank Hollow 1 Fair, SE SW SW 16-22-9w, dry, T.D. 3,830 ft., Topeka 2,670 ft., Lansing 3,157 ft., conglomerate 3,494 ft., Kinderhook 3,524 ft., Viola 3,668 ft., Simpson sand 3,744 ft., Simpson shale 3,746 ft., Arbuckle 3,797 ft.

Rice County: Brunson Drlg. 1 Ringwald, N½ NE NW 32-18-10w, dry, T.D. 3,348 ft., Topeka 2,555 ft., Lansing 2,942 ft., conglomerate 3,218 ft., Arbuckle 3,315 ft.

Thomas County: Alva Billings et al 1-A Ryan, E½ NE SE 27-8-32w, dry, T.D. 4,652 ft., Mississippi lime 4,647 ft.

Fields

Forest Hills, Russell County: Appleman et al 2 Steinlie, N½ NE NW 29-15-12w, pumped 124 bbl., Arbuckle 3,340-51 ft.

Hendrickson, Reno County: Dines et al 1 Peterson, SE cor. 35-22-10w, pumped 76 bbl., Viola 3,729-43 ft., T.D. 3,745 ft.

Henne, McPherson County: Texas 2 Tolle, S½ SE SE 16-17-1w, dry, T.D. 2,707 ft.

Lindsborg, McPherson County: M. & L. Oil Co. 1 Carlson, W½ SE NE 7-17-3w, pumped 486 bbl. Viola 3,361-72 ft.

Silica, Barton County: Magnolia 9 Roetzel, N½ NW SE 25-20-11w, pumped 125 bbl., Arbuckle 3,301-14 ft.

Smyers, Rice County: Westgate-Greenland 1 Smyers, NE SE SW 36-19-6w, 3,000 bbl., Mississippi lime 3,332-59 ft.

Continental Oil 1 John, NE SE NW 36-19-6w, pumped 210 bbl., Mississippi lime 3,340-52 ft., T.D. 3,376 ft.

Trapp, Russell County: Champlin Ref. 1-A Tittel, S½ SW SE 14-15-14w, pumped 150 bbl., Arbuckle 3,348-55 ft.

Stanolind 1-B Seliens, SW SW NW 19-15-13w, abandoned location.

Miscellaneous

Butler County: Cromwell & Lewis 1 Benninghoff, NE SE NW 17-28-6, dry, T.D. 3,144 ft.

Recompletions

Barton County: Shell 10-B Schneider, NW SE NW 1-16-14w, water disposal, T.D. 3,618 ft., old T.D. 3,320 ft.

Kingman County: Earl Wakefield 1 McMichel, SW NW SW 12-27-10w, dry, T.D. 4,535 ft.

Rooks County: Atlantic Ref. 1 McClay, NW NW SW 12-9-17w, pumped 1,314 bbl., Lansing 3,306-11 ft., old T.D. 3,242 ft., old potential 1,321 ft.

Russell County: Appleman 3 Dodge, SE NW SW 32-11-15w, pumped 10 bbl. an hr., Regan sand 3,147-52 ft., old T.D. 2,869 ft., in Lansing.

NEBRASKA

ST. JOSEPH, Mo., Apr. 20.—Gloom settled about Richardson County, Nebraska, the past week as Skelly Oil Co. 1 Wiltse well in the Dawson pool went to water and Viola production for the state was set back. Skelly was the second operator to find Viola oil in the pool. Power Oil Co. was the first, at its 1 Bohrer, but that well still cannot produce because of a heavy flow of water from above. In C E½ NW SE 10-1n-14e and 13 ft. higher on the structure, Skelly set pipe at 2,885 ft. and drilled to 2,909 ft. Oil came into the hole at the rate of 50 bbl. per day, but after acidization with 1,000 gal. there was virtually nothing but water. Some observers believed the pay had been entered too deep and that another well higher on structure would produce. Meanwhile, Skelly has started deepening 1 Wiltse to the Wilcox sand.

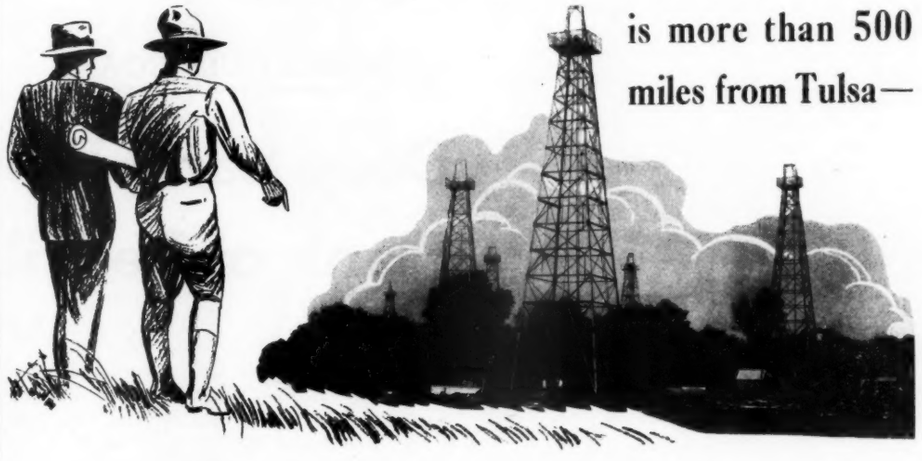
Brown & Clampitt were drilling 1 Cornelius in the same pool, SE NE 4-1n-14e, and were below 1,675 ft. on their way to Viola lime.

Skelly Oil Co. was ready to test 2 Schawang in

(Continued on Page 97)

1st of Tulsa 47 YEARS UNINTERRUPTED SERVICE

His production at Keensburg, Illinois is more than 500 miles from Tulsa—



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TEXAS GULF COAST

New Producing Area Opened South of Ganado Field

By F. L. SINGLETON

HOUSTON, Tex.—A new producing area, 1 mile south of the Ganado field, Jackson County, was assured by Gulfboard Oil Co. 1 J. E. Harmon which is drilling ahead in shale below 6,403 ft., following a 15-minute drill-stem test at 5,361-74 ft., which recovered 1,320 ft. of 27.8-gravity oil. After making the test, the well was cored ahead and sandy shale with an oil show was logged at 5,374-84 ft. High-gravity oil was first opened on this structure around 5,000 ft. Later development opened crude production at 5,500 ft., and more recently at 6,300-6,400 ft. Thus far the 5,300-ft. sand is the only section in the Frio in which showings have been logged and the well apparently opens a new area, possibly separated from the field proper by a fault.

Meanwhile, J. B. Coffee et al 1 T. N. Mauritz, an outpost well in the Mauritz field, Jackson County, was being prepared for a production test. The well was drilled to a total depth of 6,760 ft., and 5½-in. casing cemented at 5,710 ft. after an electrical survey showed possible production in the regular field pay. Development in Jackson County continues to lead the district in development. Although drilling has been curtailed, mild drilling programs still exist at the North La Ward, West Ranch, West Ganado and Maurbro fields, all of which are producing from one or more sands in the Marginulina-Frio sands.

On the north side of the Spindletop field, Jefferson County, Stanolind Oil & Gas Co. was preparing to acidize 105 Gladys City, after the well failed to flow when tested through perforated casing at 4,770-85 ft. The well showed a small amount of mud, oil and gas while swabbing. Total depth of the well is 4,809 ft.

Wilcox sand production in the new Camp Eleven field, Tyler County, was defined to the northeast by the abandonment of American Republics 3 fee, at a total depth of 8,206 ft. Only slight showings were logged, and no attempt was made to test. In the meantime Stanolind Oil & Gas Co. was attempting to open a new Wilcox sand in the Fred field as preparations were being made to test an offset to the discovery well. Total depth of the well is 10,003 ft., casing was perforated in the upper Wilcox at 8,600-13 ft. where a recent drill-stem test recovered pipe-line oil. The new pay is about 400 ft. deeper than the discovery well which was completed around 8,200 ft. Geological markers have not been released on the second well and it cannot be correlated with the discovery well, although it is believed to be about normal. Two miles north of Warren in the B.B.B.&C. Survey, Humble Oil & Refining Co. has derrick up for 1 C. E. Goolsbee, a projected 10,000-ft. test.

After establishing gas-distillate production in the Yegua sand, Pure 1 Albaness, discovery well of a new field in the Alief area, Harris County, has been killed and the well will be tested in another sand section around 7,800 ft. On a recent test, the well flowed 37 bbl. of distillate and 22 bbl. salt water daily through a ¼-in. choke from perforated casing at 8,066-80 ft. The importance of this new field is expected to be determined at an early date as the company announced location for 1 E. G. Saidous, a projected 9,000-ft. test located 4,800 ft. west of the discovery well in the Henry K. Lewis Survey.

Although details were not available, Phillips 1 Jericho, located on the southeast flank of the Millican salt dome, Brazos County, is reported to have swabbed salt water on a production test for the second time, and a third test was scheduled to be made at the close of the week. Total depth of the well is 3,559 ft., and a section of Wilcox sand is reported to have carried showings of oil in the top section and salt water in the lower section.

TEXAS GULF COAST COMPLETIONS

Wildcats

Austin County: Humble 1 Miller, top Cockfield 3,377 ft., Crockett 4,400 ft., Sparta 4,970 ft., Weches 5,315 ft., Reklaw 5,520 ft., Wilcox 6,400 ft., dry, T.D. 8,110 ft.

Fort Bend County: Prospect Drilling Co. 1 A. E. Holmes, dry, T.D. 8,210 ft.

Jackson County: J. F. Hutchins 1 A. T. Gray, dry, T.D. 6,183 ft.

Fields

Camp Eleven, Tyler County: American Republics 3-E Cushing fee, dry, T.D. 8,260 ft.

Danbury, Brazoria County: Rowan Drilling Co. 17 Jameson, dry, T.D. 5,002 ft.

Fig Ridge, Chambers County: Cox & Hamon 1 McCarthy, 125 bbl., 7/64-in. choke, perf. casing 8,546-60 ft., T.D. 8,595 ft.

Ganado, Jackson County: Humble 3 Branch, 196 bbl., ⅛-in. choke, perf. casing 6,390-94 ft., T.D. 6,750 ft.

Lake Creek, Montgomery County: Superior 1 South Texas Development Co., 213 bbl., 15/64-in. choke, perf. casing 11,775-11,815 ft., T.D. 10,300 ft.

Luckey, Matagorda County: Stanolind 2 Hubner, dry, T.D. 8,980 ft.

Maurbro, Jackson County: Humble 3 Gayle, 132 bbl., ⅛-in. choke, sand 5,211-15 ft.

North La Ward, Jackson County: Gulf 1 Four Way Ranch, 406 bbl., 3 hr., ¼-in. choke, sand 5,203-20 ft.

Gulf 2 Pickering, 21 bbl. 3 hr., ⅛-in. choke, sand 5,218-22 ft.

Oyster Bayou, Chambers County: Sun 2 Middleton, 185 bbl., ⅛-in. choke, perf. casing 8,290-8,330 ft., T.D. 8,404 ft.

Sheridan, Colorado County: Shell 4 Plow Realty Co., 173 bbl., ¼-in. choke, T.D. 10,062 ft., P.B., T.D. 9,400 ft.

West Ganado, Jackson County: Pure 3 Kuretsch, 105 bbl., ⅛-in. choke, perf. casing 4,744-68 ft., T.D. 4,850 ft.

Pure 2 Power, 97 bbl., ⅛-in. choke, perf. casing 4,767-72 ft., T.D. 4,850 ft.

West Ranch, Jackson County: Magnolia 97-A West Ranch, 121 bbl., 7/64-in. choke, T.D. 5,767 ft.

Magnolia 241-A West Ranch, 21,000,000 cu. ft. gas, open flow, perf. casing 5,014-88 ft., T.D. 5,105 ft.

Withers, Wharton County: F. W. Michaux 37-A Pierce, 174 bbl., 5/32-in. choke, perf. casing 5,350-60 ft., T.D. 5,400 ft.

F. W. Michaux 58-A Pierce, 158 bbl., 5/32-in. choke, perf. casing 5,298-5,305 ft., T.D. 5,365 ft.

F. W. Michaux 59-A Pierce, 199 bbl., 5/32-in. choke, perf. casing 5,328-34 ft., T.D. 5,375 ft.

LOUISIANA GULF COAST

Deep Sand Produces on Flank of Leeville Dome

By F. L. SINGLETON

NEW ORLEANS, La.—Although exploration around the flank of old salt structures in the Louisiana Gulf Coast district has been curtailed by the recent M-68 order, this type of development is still encouraged as restricted drilling continues to open new reserves. The latest strike was opened on the extreme southeast flank of the Leeville dome, La Fourche Parish, where Texas 86 L. L. & E. flowed at the daily rate of 235 bbl. of 29.2-gravity oil through a 5/32-in. choke from perforated casing opposite oil sand at 10,078-85 ft. Total depth of the well is 10,328 ft. This is the deepest production yet developed around the flanks of the structure, being located about 4,000 ft. south of the company's 70 L. L. & E., a 9,700-ft. dry hole and about 5,000 ft. southeast of 80 L. L. & E., a 7,900-ft. producer on the east flank. Prior to 1939, most of the production on this structure had been from the Miocene sands on top of the structure. However, in 1940 development was extended to the west flank which resulted in deeper production being developed from various sands at intervals from 7,900-9,000 ft. At the present time, deep sand production practically circles the entire northwest, west and southwest flanks, and the recent completion indicates that deep-sand production may flank the entire structure.

Around the town of Merryville, Beauregard Parish, Sun Oil Co. is reported to have made tentative location for a Wilcox test on its large block recently assembled around Township 3s-12w. The Wilcox sector gained two new operations as material was being moved in for R. S. Bond 1 O'Neal located in 20-5n-3e, Rapides Parish, while in Vernon Parish, W. R. Smith is slated to move in material for 1 Nona Mills, located in the Hadden Ferry area in 31-3n-11w.

In the West Gueydan field, Vermilion Parish, Pure 2 Acadia-Vermilion Irrigation Co., a northeast outpost, was being watched with much interest due to a reported oil and gas show logged below 10,500 ft. At this depth the well is considerably deeper than proven production which has been confined to a comparatively small area by abandoned holes which were quit above 10,000 ft.

Sun Oil Co. has entered into development at the Lewisburg field, Acadia Parish, by announcing location for 1 Thibodaux, about 4,500 ft. north of the discovery well in 7-7s-3e. In the meantime, Stanolind has resumed drilling at 1 Dohmann, located about 1 mile northeast of the field in St. Landry Parish. At the close of the week the well was drilling ahead in shale below 10,560 ft. Several electrical surveys have been made of the hole, but details as to what the survey showed were not available.

On the north edge of the Lake Chicot field, St. Martin Parish, Amerada and Phillips Petroleum Co. staked location for 1 Case & Kerzweig in 31-11s-10e, several hundred feet northeast of 1 Case, recently completed as a north extension producer in a new sand section.

The outcome of Atlantic 1 Wellburn, a southwest edge test which is seeking deep Wilcox sand production in the Neale field, Beauregard Parish is expected to be known by the first of the week as the well is drilling ahead below 10,700 ft., about 300 ft. above the expected pay horizon. Thus far three producers have been

(Continued on Page 94)

Loosening of Restrictions on Spacing Spurs Drilling

PITTSBURGH, Pa.—Since exceptions have been granted in the lower eastern fields which permitted more normal spacing for this area, oil completions are again rising which, if uninterrupted, may help sustain present production rate. An example of the amount of new production needed to improve production totals, the Pennsylvania Grade area of Southeast Ohio in 1941 is an apt illustration. Initial production from the wells reported totaled 9,862 bbl., yet at the year's end the daily average had increased only one-sixth of that. Most of this flush production was from a recent pool in Perry County in which activity is again permitted but when the limits of the pool have been reached, a rapid decline is forecast.

During the past week, a deep test proved dry and is being abandoned in Southwest Pennsylvania. In West Virginia, a new and interesting deep test is starting. Completions totaled 22 for the week of which 4 were dry, 13 gas wells, and 5 oil producers with a daily initial of 484 bbl.

SOUTHWEST PENNSYLVANIA COMPLETIONS

Clarion County, Limestone Township: R. M. Burnham Gas Co. 1 H. P. Aaron, dry, through Speechley, T.D. 2,478 ft.

Red Bank Township: Kimmel Oil & Gas Co. 2 James Carlys, dry, T.D. 3,000 ft.

Indiana County, Young Township: Apollo Gas Co. 1 A. D. Wilson, 40,000 cu. ft. gas, Thirty-foot sand 1,920 ft., gas 2,032 ft., Bradford sand 3,480 ft., gas 3,482 ft., R.P. 400 lb., T.D. 4,052 ft.

Washington County, Deemston Boro: Thomas Myers et al 1 Homer Crumrine, drilled deeper, 400,000 cu. ft. gas, Elizabeth sand 2,940-59 ft., gas 2,944-57 ft., T.D. 3,058 ft.

WEST VIRGINIA

About 3¾ miles west of the axis of the Burning Springs anticline in Spring Creek district, Wirt County, Benedum & Trees are starting a deep test on the Park Smith farm which starts at an elevation of 808.49 ft. This is the third deep test by these operators now under way, the first being on the Pearl Broadwater farm in Meade district, Tyler County, which is now held up with a bad fishing job at 5,100 ft., the second on the L. J. Rinehart farm in Grant district, Ritchie County, which is now drilling in the Injun sand at about 1,800 ft. A fourth test is scheduled and is expected to be located in Pleasants County. The new test is located 0.38 mile south Lat. 38° 55′ and 1.6 miles west Long. 81° 20′.

In Freemans Creek district, Lewis County, Hope Natural Gas Co. has reached 6,460 ft. in the rotary test on the J. D. Lovett farm. The Lower Devonian is expected deeper than 7,000 ft.

WEST VIRGINIA COMPLETIONS

Braxton County, Otter district: Kenna McCulty et al 3 P. S. Gerwig, 300,000 cu. ft. gas, Injun sand, T.D. 2,350 ft.

Calhoun County, Washington district: Hope Natural Gas 8595 C. C. Knotts, 55,760 cu. ft. gas, Blue Monday sand 1,619-48 ft., Big lime 1,648-1,750 ft., Injun sand 1,750-1,810 ft., gas 1,716-1,720 ft., shot 1,716-1,723 ft., T.D. 1,829 ft.

Hope Natural Gas Co. 8596 C. C. Knotts, 63,230 cu. ft. gas, Big lime 1,620-92 ft., Injun 1,692-1,763 ft., gas 1,663 ft., gas 1,745-52 ft., shot 1,744-1,758 ft., T.D. 1,796 ft.

Gilmer County, Troy district: Gilco Oil & Gas Co. 4 W. I. Rymer, 2 bbl., Gantz sand 2,275-2,305 ft., Gordon 2,482-87 ft., show oil 2,290-98 ft., T.D. 2,527 ft.

Lincoln County, Sheridan district: Huntington Development & Gas Co. 1 Sweetland Land & Mining Co., deepened, 44,730 cu. ft. gas, started 2,116 ft., brown shale 2,906-3,248 ft., shot 2,857-3,259 ft., R.P. 400 lb. 18 hr., T.D. 3,252 ft.

Washington district: South Penn Natural Gas Co. 2 Joel McCormick, 2 bbl., Big lime 1,669-1,869 ft., Injun 1,869-1,915 ft., Berea 2,350-70 ft., oil in Berea, T.D. 2,374 ft.

Putnam County, Curry district: Midland Gas Co. 1 J. M. Phelps, 242,000 cu. ft. gas, Big lime 1,470-1,654 ft., Injun 1,656-1,726 ft., Berea 2,162-81 ft., shot 2,162-81 ft., R.P. 420 lb. 24 hr., T.D. 2,183 ft.

Upshur County, Meade district: Cumberland & Allegheny Gas Co. 317 D. H. and William Winemiller, 959,000 cu. ft. gas, Fifth sand 2,257 2,374 ft., gas 2,262-69 ft., T.D. 2,274 ft.

ORISKANY GAS FIELDS

Jackson County, Ripley district: United Fuel Gas Co. 5076 W. T. Harrison, 2,795,000 cu. ft. gas, Big lime 1,780-1,820 ft., Injun 1,820-95 ft., Berea 2,285-2,300 ft., Corniferous lime 4,810-4,910 ft., Oriskany 4,910 ft., shot 4,912-43 ft., T.D. 4,969 ft.

United Carbon Co. 1003 J. L. Presley, 8,718,000 cu. ft., gas; Corniferous lime 5,001 ft., Oriskany 5,105 ft., gas 5,105-14 ft., R.P. 1,700 lb. 36 hr., T.D. 5,117 ft.

Kanawha County, Poca district: Columbian Carbon Co. 1 J. I. Kersey, 12,000,000 cu. ft. gas, Corniferous lime 5,098 ft., Oriskany 5,219 ft., R.P. 1,220 lb. 24 hr., T.D. 5,244 ft.

Godfrey L. Cabot, Inc., 1 Chartiers Oil Co., 1,500,000 cu. ft. gas, Corniferous lime 5,049 ft., Oriskany 5,175 ft., shot 5,186-96 ft., R.P. 1,400 lb. 64 hr., T.D. 5,263 ft.

Godfrey L. Cabot, Inc., 2 Chartiers Oil Co., 424,000 cu. ft. gas, Corniferous lime 5,108 ft., Oriskany 5,236 ft., shot 5,244-56 ft., R.P. 1,525 lb. 71 hr, T.D. 5,236 ft.

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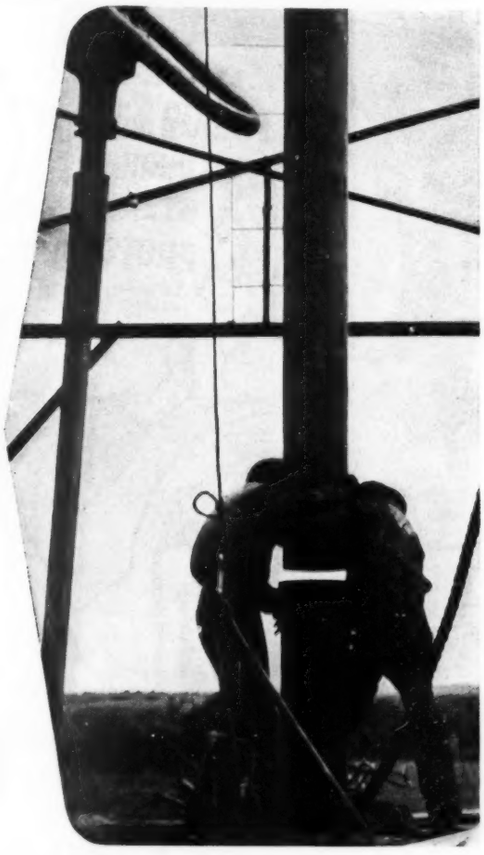

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OKLAHOMA FIELD REPORT

Interest Centers Around the Anadarko Basin Sector

By CARL HOOT

INTEREST in Oklahoma still centers around Pure Oil Co.'s new discovery, the 1 Teter in Garvin County. Total depth of the well is 3,906 ft., tubing has been run and operators have made connections for final completion. About 3 miles to the southeast, Pure 1 Price, SW SW SE 4-3-1, is drilling below 2,600 ft. (See Page 88 this issue.)

In the Apache field of Caddo County, Texas Co. continues to bring in big producers. On the west side of the field, 2 Smith, NE SE NE 3-5-12w, flowed 596 bbl. of oil in 1 hour. It was estimated that the well would make over 14,000 bbl. a day at this rate and is probably the best of the 19 completions in the field, of which Texas Co. owns 16. Gas was estimated at 6,000,000 cu. ft. per day. Two weeks ago the 1 Smith, NE NE NE 3-5-12w, made 487 bbl. in 1 hour. The 6 Mulkahay, NE SE SE 2-5-12w, was drilling below 5,300 ft. and looking for the Wilcox.

OKLAHOMA COMPLETIONS

Wildcats

Grady County: Hurst 1 DeLaittre, NE NW 21-9-7w, abandoned location.

Latimer County: Rhinehart 1 Dugger, NE SW SW 14-6-18, dry, T.D. 273 ft.

Lincoln County: Norbla Drlg. 1 Meyer, SE NE 12-16-5, dry, T.D. 3,479 ft., Bartlesville 3,472 ft.

Marshall County: Pure Oil 1 Williams 109, SE NW 20-5s-7, flowed 427 bbl. in 4 hr., potential 2,496 bbl., McLish 5,472 ft., T.D. 5,911 ft.

Okfuskee County: Summit Drlg. 1 Ruch, NW NW SW 14-12-10, 1,500,000 cu. ft. gas, Booch 2,554-80 ft., P.B. 2,850 ft.

Seminole County: Texas 1 Jackson, NE SE SE 15-7-7, dry, T.D. 3,513 ft., Senora sand 2,100-15 ft., Senora lime 2,178 ft., Booch 3,230 ft., Gilcrease 3,277 ft., Cromwell 3,500 ft.

Stephens County: Lundy 1 Ledbetter, SE SE 21-1s-7w, dry, T.D. 5,018 ft.

Pace 1-C Nelson, SE NE 28-1s-8w, dry, T.D. 2,511 ft.

Fields

Dilworth, Kay County: McKnabb 4 Warren, NW SE NW 19-28-1, abandoned location.

McKnabb 5 Warren, SW SE NW 19-28-1, abandoned location.

Hotulke, Pottawatomie County: Phillips 1 Billington, SW NE 25-9-4, flowed 119 bbl., Hunton 4,108 ft., T.D. 4,491 ft.

Oklahoma City, Oklahoma County: British American 1 Terrace, SE NW NE 27-12-3w, pumped 435 bbl., Wilcox 6,384 ft., T.D. 6,567 ft., shot.

Miscellaneous

Creek County: Zephyr Drlg. 2 Emarthlocee, NW NE SW 34-17-8, abandoned location.

Sinclair Prairie 19 Yarhola, NW NW 9-17-7, pumped 8 bbl., Bartlesville 2,642-2,730 ft.

Okfuskee County: British American 1 Dodson, SW NW NW 31-12-10, flowed 45 bbl., Hunton 3,776-78 ft.

Recompletions

Caddo County: Nichols 1 Rigney, NW SE 12-5-9w, flowed 150 bbl., sand 3,700 ft., T.D. 3,872 ft., old T.D. 2,426 ft.

Creek County: Franchot 1 Richards, NE NE 1-16-8, dry, T.D. 3,149 ft., old T.D. 2,808 ft.

Louisiana Gulf Coast Fields

(Continued from Page 92)

completed in this deep sand and the trend of production is being watched with much interest.

Approximately 2,000 ft. southwest of production in the Bastian Bay field, Plaquemines Parish, Phillips 1 Fasterling is bottomed at a depth below 10,000 ft., and casing has been cemented for testing. An electrical survey was made, and while details were not available, the production test is expected to be made around 9,300 ft., the discovery sand. Location is in 47-26s-29e.

Markley-Bankhead, Inc., 1 Iberville Land & Mortgage Co., a southwest outpost in the Happytown field, St. Martin Parish, is coring below 9,900 ft., and is reported to have logged sand with an odor of oil and gas. Whether the showing was sufficient to test was not disclosed but the well is expected to be drilled several hundred feet deeper before any test is made. This well is located on a farmout lease from Shell Oil Co., Inc.

LOUISIANA GULF COAST COMPLETIONS

Fields

Grand Bay, Plaquemines Parish: Gulf 18-A Grand Prairie, junked, T.D. 937 ft.

Gulf 17-C Grand Prairie, 349 bbl., 5/32-in. choke, perf. casing 9,995-10,005 ft., T.D. 10,015 ft.

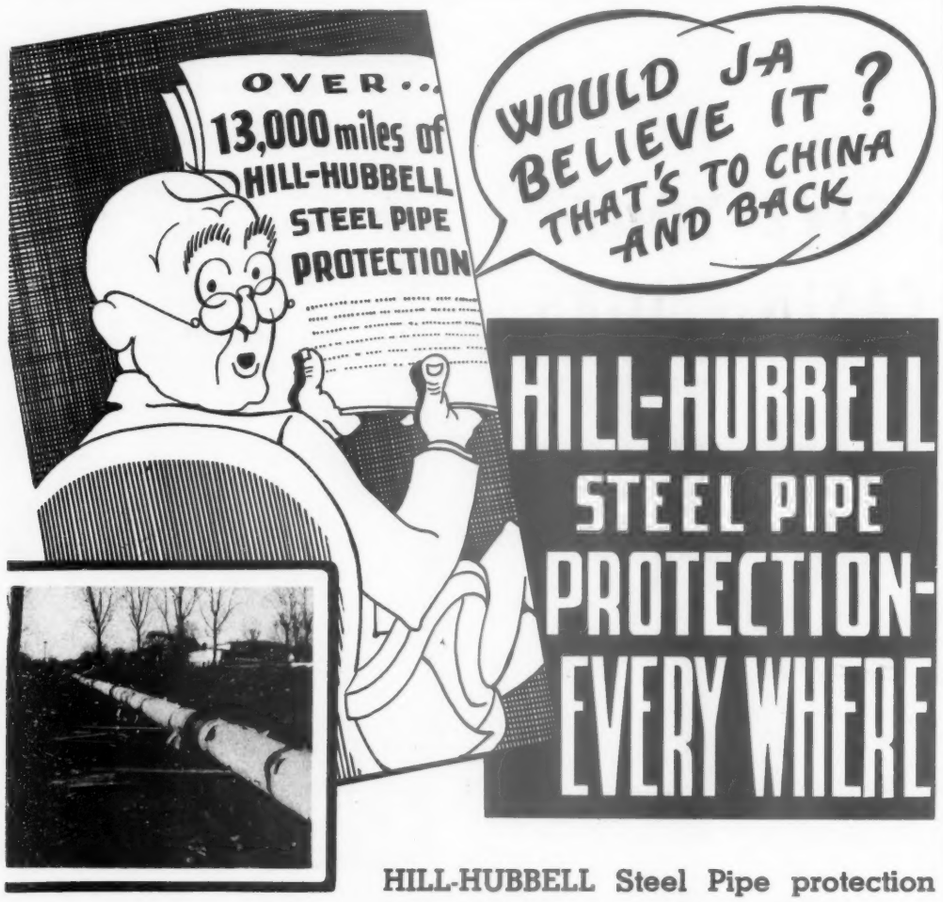
Jefferson Island, Iberia Parish: Texas 6 State, 136 bbl., 8/64-in. choke, perf. casing 8,422-40 ft., T.D. 9,248 ft.

Leeville, La Fourche Parish: Texas 86 Leeville, 235 bbl., 5/32-in. choke, perf. casing 10,078-85 ft., T.D. 10,328 ft.

Paradis, St. Charles Parish: Texas 24 L. L. & E. Paradis, 497 bbl., 4/8-in. choke, perf. casing 10,076-10,100 ft., T.D. 10,490 ft.

West Cote Blanche, St. Mary Parish: Texas 2 State, 130 bbl., 9/64-in. choke, perf. casing 4,970-5,020 ft., T.D. 8,791 ft.

West Hackberry, Cameron Parish: Stanolind 62 State, 582 bbl., ¼-in. choke, perf. casing 9,210-40 ft., T.D. 9,326 ft.



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SOUTHWEST TEXAS

Carrizo Production in Bee County Extended Northwest

By F. L. SINGLETON

CORPUS CHRISTI, Tex.—Probably the most important development in the Southwest Texas district the past week took place in the new South Caesar field, Bee County, where Luling Oil & Gas Co. 1 Tom Slick, 7,000 ft. northwest of the discovery well, was flowing pipe-line oil and wash water while testing through perforated casing at 6,642-46 ft. Sand and shale showing gas and distillate was cored in the discovery pay at intervals from 6,493-6,550 ft. and casing was cemented for testing after coring another sand section at 6,611-64 ft., which showed from 1 to 5 per cent saturation. The salt-water level was believed to have been established at 6,664-73 ft. The discovery of this field in March attracted wide attention and resulted in a widespread leasing campaign throughout the county. The discovery well, Tom Slick 1 Grissom was completed as the first commercial producer in the Carrizo sand at 6,552-55 ft. While geological markers on the extension well have not been released, the presence of a uniform sand section is indicated, and the area is due to receive an increase in development.

In the meantime, a new gas field was opened in the county as I. K. Howeth 1 Homer Harris, a wildcat 9 miles west of Beeville in the D. Ribas Survey, was flowing an unestimated amount of gas with a spray of distillate while testing through a ¼-in. choke. Tubing pressure was 1,300 lb. This well was drilled to the Pettus sand at 4,717 ft., and was plugged back and completed in the Hockleyensis formation at 3,737-39 ft. Including the development in the South Caesar field, Bee County, has become one of the most active areas in the district.

Nueces County had promise of a new field with the running of casing in L. A. Douglas and Republic Natural Gas Co. 1 M. G. Allen, a wildcat located 6½ miles southeast of Robstown. With the hole bottomed at 7,513 ft., casing was being cemented for testing following an electrical survey which showed favorable indications. The well is to be tested in a sand section at 7,062-89 ft., where side-wall cores recovered sand with a good oil odor that tested 2 to 5 per cent saturation. Other sands were logged at 6,115-50 ft., 6,170-6,230 ft., 6,710-70 ft. and 7,400-88 ft., but all were logged as probable salt-water sands. Location of the prospective pool opener in the J. H. Smith Survey 25.

Additional development was believed to be slated for the extreme east side of the Stratton field, Nueces County, by the showing of Humble 2 King Ranch, 1 mile west of the field across the county line in Jim Wells County. The well has been in the process of testing for the past several weeks, and is slated for a potential test after it flowed 64 bbl. of 47.3-gravity oil daily through a ¼-in. choke from perforated casing opposite sand at 6,960-70 ft. Tubing pressure was 2,050 lb. This well is several hundred feet north of a recent dry hole, drilled on the large King ranch which partly defined production to the southwest.

On the northwest edge of the Ben Bolt field, Jim Wells County, H. H. Howell opened production from a shallow sand with the recompletion of 2 and 3 Whatley located in the P. D. L. Zerda and T. Bustillos surveys. Both of these wells were originally completed in the main sand at 5,200-5,300 ft., and were recompleted after plugging back and perforating casing opposite sand topped at 4,505 ft. The sand section in the two wells is approximately 10 ft. in thickness.

A new gas field was opened 1½ miles northwest of the Labbe field, Duval County, by the showing of W. C. McBride 2 J. E. Murphy, located in the J. C. King Survey 110. With the hole bottomed at 3,300 ft., 5½-in. casing was cemented at 2,560 ft., and the well is testing through perforated casing at 2,512-18 ft., flowing gas with a spray of salt water. Tubing pressure was 750 lb. There was no showing of oil. The sand section was logged at 2,505-23 ft.

An extension of several hundred feet was recorded in the Willamar field, Willacy County, with the completion of Pan American 1 Garcia, located in the San Juan de Carrecitos grant. The well is flowing at the rate of 147 bbl. daily through a $\frac{3}{16}$-in. choke from perforated casing opposite sand at 7,880-7,909 ft. The producing sand correlates about normal with other wells in the field.

Wilcox sand production in the Washburn field, La Salle County, was extended by Quintana 10 South Texas Syndicate. The well is flowing at the rate of 1,250,000 cu. ft. of gas daily through a ¼-in. choke from sand topped at 5,131 ft., and 438 bbl. of pipe-line oil daily through a ¼-in. choke from sand topped at 5,534 ft. Total depth

(Continued on Page 100)

EASTERN TEXAS FIELDS

New Woodbine Sand Pool Is Opened in Anderson County

By ROBERT INGRAM

DALLAS, Tex.—Magnolia Petroleum Co. 1 W. C. Campbell, J. B. McNealy Survey, in the Concord area of northeastern Anderson County, was completed as an oil well last week after 3 weeks of testing. It opened a new Woodbine sand pool producing low-gravity (16°) asphaltic oil on the pump from 4,545 ft. On the last gage it swabbed 165 bbl. with no water in 24 hours, running the swab once an hour. Total depth, plugged back, was 4,540 ft., with top of the Woodbine at 4,520 ft.

Magnolia started the well on a 5,200-acre block, but when favorable structure began to be shown the firm started buying and added about 3,200 acres in the surveys west, northwest, north, and northeast of the McNeely Survey. Other companies also entered the play, including Stanolind Oil & Gas Co., British American, Carter-Gragg Oil Co., Phillips Petroleum Co., and Pure Oil Co.

The rig used on the discovery well was to be kept in the area by Magnolia to use in drilling another test. Location for the second well was expected soon. The company was moving in pumping equipment and was building storage for final completion and had estimated the potential of the well at 150 bbl. pumping.

Kildare Offset Started

Phillips Petroleum Co. was building derrick for 1 Benefield & Singleton, J. Wanhope Survey, east offset to the Kildare field discovery well in southern Cass County, 4 miles north of the Jefferson pool. Production in the field, found in March, comes from the Rodessa section of the Glen Rose lime.

C. C. Gilger 1 Grogan, Watson Survey, north offset to the discovery, was still shut down at 5,800 ft. and trying to remove an obstruction from the hole. Operator hoped to resume drilling in a few days.

Hopkins County Wildcat Dry

W. B. Hinton and Talco Asphalt & Refining Co. 1 Crisp, Ulysses Acquier Survey, Paluxy sand wildcat in the Birthright sector of Hopkins County, was plugged and abandoned at 4,832 ft. in the Paluxy section. Top of the Paluxy was reported at 4,707 ft. There were not shows of either oil or gas and the test cut the fault to run about normal with the first dry hole in the area. The same operator's 1 Long was abandoned at 4,895 ft.

The first test had a good showing of oil in the Paluxy but could not be completed as a commercial producer because of water in the sand. There was considerable interest in the second test when it was reported running high on upper formations, particularly the Austin chalk at subsea depth of 2,451 ft. compared with subsea of 3,022 ft. on the 1 Long. Also, the Crisp was nearly 300 ft. high to the Long on top of the Georgetown lime, but the Paluxy came in about normal.

Nacatoch Play Increased

W. W. Groneman 1 Dublin Grocery Co., Sanchez Survey, Rusk County, offset to the O. W Killam 1 Bass which opened a Nacatoch sand oil pool southwest of the Pleasant Grove Woodbine sand pool, set casing at around 2,880 ft., and was preparing to test. It was reported high on top of the Nacatoch compared to the discovery.

Meantime, L. O. McMillan of Dallas set surface casing at an outpost in the pool, the 1 D. K. Heath in the southeast corner of the lease in the J. I. Sanchez Survey and about 2,000 ft. northwest of the Killam well. If the Nacotch is found dry, hole will go to the Woodbine.

EAST TEXAS COMPLETIONS

Wildcats

Angelina County: Jack Frazier et al 1 Angelina County Lumber, 1 mi. W of Huntington, dry, Crockett 650 ft., Weches 1,321 ft., Queen City 1,445 ft., Reklaw 1,492 ft., Carrizo 1,737 ft., Wilcox 1,844 ft., Midway 4,890 ft., T.D. 5,103 ft.

Fields

Chapel Hill, Smith County: Sinclair Prairie 1 G. R. Phillips, D. Parchman Sur., flowed 279 bbl. through $\frac{7}{8}$-in. choke, T.D. 8,266 ft.

Texas 1 D. Walton, P. G. Landers Sur., dual well, flowed 316.44 bbl. through ¼-in. choke, T.D. 8,206 ft.

Hawkins, Wood County: Humble 3 Ivey Rutherford, H. E. Watson Sur., dry, Pecan Gap 2,993 ft., Austin chalk 4,062 ft., Woodbine 4,511 ft., Georgetown lime 4,669 ft., T.D. 4,698 ft.

Ellenburger Production in Prospect in Jack County

By ROBERT INGRAM

FORT WORTH, Tex.—Prospects for an Ellenburger lime oil field in Jack County, the first Ordovician production in that part of the state, were good last week at Taubert & McKee 1 Boyd, 2 miles south of Post Oak in the Hazel Survey. The well showed free oil early in the week on a drill-stem test at 6,430 ft. It was then deepened 5 ft. and 5½-in. casing was set at 6,288 ft. in Ellenburger (see The Oil and Gas Journal, April 16, 1942).

Testing was delayed by heavy rains which made roads virtually impassable, but when crews got back in at the end of the week they reported a flow of oil. Value of the show will not be known until further tests are made.

Meantime, the same operators, together with Sinclair Prairie Oil Co., were seeking deeper production, possibly Ordovician, in Jack County's 4,900-ft. Hoefle pool. These operators' 1 Anna Hoefle, northwest outpost in the west side of Lot 3, J. W. Barrett Survey, was drilling at 5,065 ft. after being shut down for several days by muddy roads. The area's regular Caddo horizon was topped at about 4,924 ft., but was dry.

Big Well in Spring Area

Largest producer of the month in North Texas was completed in Clay County's Spring-Worsham area at Continental Oil Co. 2 Earl Spring, Section 23, Block 4, H.&T.C. Survey. The well, a 1,300-ft. extension, flowed 142.4 bbl. of 45-gravity oil an hour for 8 hours through a ¾-in. choke and was estimated at 3,382 bbl. daily. Pay was from the Caddo lime at 5,630-45 ft.

With the completion of the extension, Continental moved ¼ mile northwest of the discovery, 1 Spring, for 3 Spring. The new location is 374 ft. from the south line and 4,764 ft. from east line of Section 23.

Cooke Well Sets Pipe

Having finished contract at 6,003 ft. in hard, dry dolomite, Lou Stogner 1 Berry, Hardwick Survey, north of Rosston in Cooke County, was preparing to set pipe on bottom. The well topped the Ellenburger at 5,920 ft.

A new oil pool for northern Coleman County was indicated last week by H. T. Owens 1 Melton Coker, Section 72, Block 2, G.H.&H. Survey, 2 miles northeast of the 3,600-ft. Silver Valley pool. At last report the well was cleaning out at an estimated rate of 75 to 100 bbl. of oil daily. It was also showing an estimated 250,000 cu. ft. of gas a day.

Pay was found in the Morris sand at 3,040-45 ft., and the flow was natural after plugs were drilled a week ago at 3,040 ft. To the south was the R. W. McKissick and Rhodes Drilling Co. 1 M. K. Harris, NW SW Section 72, Block 2, G.H. &H. Survey, which was abandoned last week.

NORTH CENTRAL TEXAS COMPLETIONS

Wildcats

Archer County: Bridwell Oil 1 Henry Conrady, 990 ft. from north and west lines of Lot 23, Clark & Plumb Sur., Blk. 4, 2½ mi. W of Windthorst, dry, T.D. 1,205 ft.

Knox County: Sietz, Comegys & Seitz 1 M. Winfield, 330 ft. from south and west lines of N½ Sec. 181, B.B.B.&C. Sur., Blk. A, 8 mi. NE of Goree, dry, T.D. 1,834 ft.

Fields

K.M.A., Wichita County: G. E. Kadane & Son 1 R. J. Bracley, 330 ft. from E line and 1,485 ft. from S line of U. G. Gahagan Sur., A-35, flowed 140 bbl. in 3 hr. through 1-in. choke on tubing, est. potential 1,120 bbl., pay sand 3,725-3,825 ft. and 3,857-67 ft., shot, T.D. 3,857 ft.

K.M.A.-Ellenburger, Wichita County: Buffalo Oil 6-E W. P. Ferguson, 330 ft. from S line and 400 ft. from E line, Lot 5, W. H. Spillers Sur., A-257, flowed 82 bbl. in 3 hr. through ¼-in. tubing choke, est. 656 bbl., acid, pay 4,261-4,319 ft.

Deep Rock Oil 1-E E. H. Hamilton, 380 ft. from E line and 467 ft. from SE of farm in E. Durian Sur., A-53, flowed 125 bbl. in 3 hr. through tubing, est. 1,001 bbl. potential, pay 4,225-92 ft.

Sunray 13-E Anna Mangold, 467 ft. from N line and 690 ft. from E line of W 60 acres of S 120 acres, Lot 38, P. Castleman Sur., A-35, flowed 140 bbl. in 3 hr. through 1-in., pay 4,252-4,332 ft.

Ringgold, Clay County: Continental 1 E. Spring, 200 ft. from N line and 1,254 ft. from W line, Sec. 24, H.&T.C. Sur., Blk. 4, old well acidized, flowed 2,547 bbl., old potential flowed 430 bbl., lime 5,586-5,630 ft.

Rock Crossing-Ellenburger, Wilbarger County: Phillips 217 W. T. Waggoner ranch, 330 ft. from S and E lines of W½ Sec. 46, H.&T.C. Sur., Blk. 4, potential 933 bbl., pay 3,788-99 ft.

Thornberry, Clay County: W. R. Lyon et al 1 Roy Lovn, 1,650 ft. from E line and 330 ft. from S line, Sec. 90, Byers Bros. Sur., dry, T.D. 1,880 ft.

Miscellaneous

Archer County: Phillips 14 Pan-M. E. Rogers, 4 mi. SE of Megargel in Swastika pool, 150 ft. from S and W lines of 80 acres in west 120 acres, S½ Sec. 1600, T.E.&L. Sur., dry, T.D. 1,313 ft.

Cooke County: Kewanee Oil & Gas 20 Hyman Lanier-B, E.T. Sur., A-363, pumped 10 bbl., shot 1,315-20 ft. and 1,495-1,500 ft.

Young County: W. R. Worthington 1 Marietta Killian, 550 ft. from E line and 750 ft. from N line, Sec. 211, T.E.&L. Sur., Olney pool, pumped 10 bbl., shot 940-49 ft.

WEST CENTRAL TEXAS COMPLETIONS

Wildcats

Fisher County: Masters Oil 1 W. M. Fancher et al, Sec. 55, Blk. 1, H.T.&B. Sur., dry, lime 3,055 ft., T.D. 3,391 ft.

Jones County: Ungren & Frazier 1 J. M. Radford estate, Sec. 20, Blk. 16, T.&P. Sur., dry, Saddle Creek lime 2,023-28 ft., T.D. 2,651 ft.

Fields

Caddo, Stephens County: E. B. Wilson 1 G. T. Sandidge, Sec. 47, Blk. 5, T.&P. Sur., dry, shot 3,937-48 ft., T.D. 4,110 ft.

Cook, Shackelford County: Roeser-Pendleton and Continental 10-A W. I. Cook estate, Sec. 117, E.T. Sur., pumped 97 bbl., sand 1,698-1,706 ft., T.D. 1,708 ft.

Hamby, Shackelford County: Sabens & Pinkston 1 F. W. Shotwell-B, Sec. 59, Blk. 14, T.&P. Sur., pumped 50 bbl., sand 1,586-93 ft., 1,603-08 ft., and 1,611 ft., T.D. 1,614 ft.

View, Taylor County: W. J. Walsh 2 T. J. Young, H. S. Day Sur., pumped 10 bbl. oil and 80 bbl. water, acid 2,373-2,409 ft., T.D. 2,409 ft.

Wimberly, Jones County: Hedrick Oil 3 Sara T. Morrison-B, Guadalupe Martinez Sur. 137, flowed 144 bbl. in 18 hr. through ¼-in. choke natural, est. 175 bbl. potential, sand 2,219-23 ft. and 2,226-32 ft.

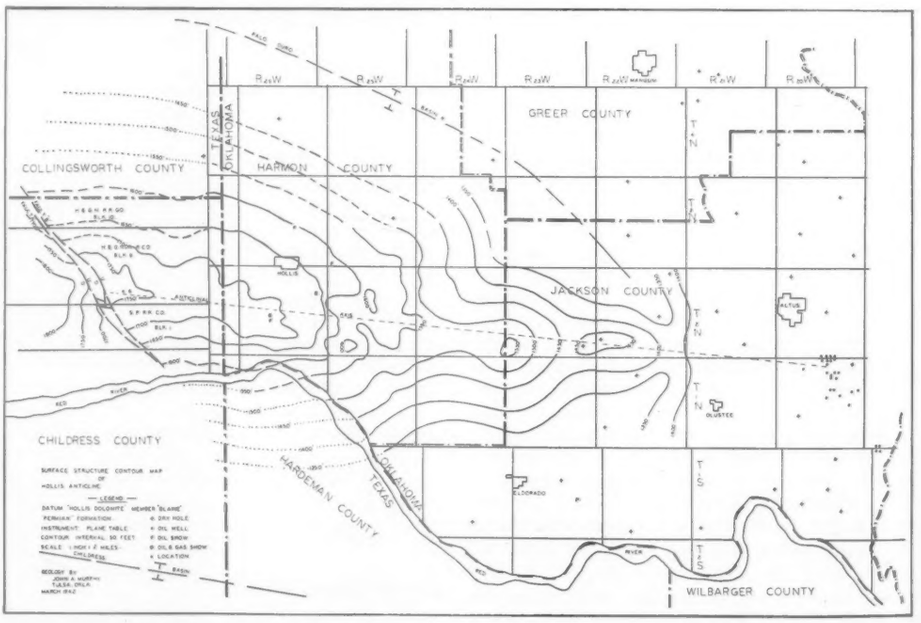
Fain-McGaha 1 Bryan Dunigan, Sec. 24, Blk. 17, T.&P. Sur., dry, Saddle Creek lime 2,195-2,225 ft., T.D. 2,304 ft.

Miscellaneous

Palo Pinto County: Hickok & Reynolds 1 R. H. Gauldin, L. P. Elder Sur., A-1474, old well, gaged 7,300,000 cu. ft. gas, sand 4,115-19 ft., lime 4,119-27 ft.

Shackelford County: C. J. Kiener et al 2 Dawson-Conway-B, Sec. 146, E.T. Sur., pumped 4 bbl. oil and 5 bbl. water, shot 1,398-1,410 ft., T.D. 1,738 ft., P.B. 1,410 ft.

TEST ON HOLLIS ANTICLINE STARTED



AN attempt is being made by John A. Murphy, Tulsa operator, to extend production in the Red River area about 50 miles farther west by a test located in northeastern Childress County, Texas. Surface geology as mapped by Mr. Murphy shows the wildcat to be located on a broad anticline extending a little north of west from the Altus field, Jackson County, Oklahoma.

Four wells drilled along the structure show considerable thinning in the Canyon and Strawn sections toward the west. Two of the wells, Texas 1 Smith and Humble 1 Smith, were drilled in northern Childress County, west of the faults shown on the accompanying map. The others, Kilgore 1 Cole, 21-2n-26w, Harmon County, and Fain & Porter 1 Wilson, 30-2n-23w, Jackson County, were drilled east of the faults. Tops recorded in these wells are shown in the following table.

Formation—	Texas 1 Smith	Humble 1 Smith	Kilgore 1 Cole	Fain-Porter 1 Wilson
Wichita-Albany	1,920	1,870	2,230	1,780
Pontotoc	3,480	3,350	2,810	2,710
Canyon	3,860	3,350	3,360	4,300
Strawn	4,235	4,320	5,175	5,130
Bend	None	None	Below T.D.	6,090
Mississippi lime	4,796	4,675	Below T.D.	6,090
Ellenburger	5,395	5,012	Below T.D.	6,090

The wells drilled on the Ellenburger high in Childress County were on a line of folding which runs northwest and southeast and were dry, except for a show of oil in the Pontotoc (Cisco) in Humble 1 Smith at 3,735 ft. Several shows were reported in the Canyon and Strawn in Kilgore 1 Cole between 4,030 ft. and the bottom of the hole at 5,570 ft. No shows were found in the Fain-Porter well.

Union County, Arkansas, Wildcat Shows Oil

SHREVEPORT, La.—The Marine Oil Co. 1 Frost, wildcat located near C NW NE 13-18-12, in the new London-Strong area, set production pipe after a drill-stem test showed 400 ft. of pipe-line oil in 20 minutes around 5,700 ft. The wildcat is 8 miles southeast of production in the Urbana field.

After perforating from 4,084 ft. to 4,092 ft. the Carter Oil Co. A-1 Catahoula, SW NW 5-6n-4e, wildcat of La Salle Parish, after being shut in for storage, then put on pump, pumped 86 bbl. of oil and 22 bbl. of water in 12 hours, elevation of well is 60 ft., and total depth 5,490 ft. This was a geophysical prospect well.

Arkansas was shut down most of the week because of heavy rains so very little activity other than drilling operations and routine work carried on. Louisiana's field locations were very active with 5 new locations for the Haynesville field and 12 new locations for La Salle Parish, 10 of which were located in the Nebo field, 1 for Zenoria, and 1 for the Trout area.

NORTH LOUISIANA NEW LOCATIONS

Wildcats

Vernon Parish: Shell Oil Co., Inc., 1 La. Long Leaf Lbr. Co., NE SW 15-4n-9w.

Rapides Parish: LaVerne Decker et al 1 J. A. O'Neil, SW NW 20-5n-3e.

Webster Parish: Magnolia Pet. Co. 1 W. B. Warren, NW NE 12-22n-9w.

NORTH LOUISIANA COMPLETIONS

Wildcats

Bossier Parish: R. H. Crow, Tr., 1 R. E. Wheless, SW NE 20-18n-12w, elev. 168 ft., top Nacatoch 1,000 ft., base chalk 1,672 ft., first anhydrite 3,942 ft., top Massive 4,207 ft., base Massive 4,450 ft., base Stringer 4,546 ft., Pettit formation 5,360 ft., top Pettit 5,468 ft., Travis Peak 5,710 ft., dry at 6,031 ft.

Catahoula Parish: H. L. Hunt C-1 Tensas-Delta, SW SE 33-5n-5e, elev. 53 ft., top Wilcox 4,060 ft., dry at 6,640 ft.

La Salle Parish: Atlantic Ref. Co. 1 Catahoula State Lake, NW NW 27-7n-4e, top Moodys Branch 1,330 ft., Cockfield 1,355 ft., Cook Mountain 1,920 ft., Sparta 2,040 ft., Cane River 2,723 ft., Wilcox 2,846 ft., Midway 5,393 ft., dry 5,499 ft.

Carter Oil Co. et al A-1 Catahoula Lake State, SW NW 5-6n-4e, elev. 60 ft., top Cockfield 1,317 ft., Cook Mountain 1,883 ft., Sparta 1,990 ft., Cane River 2,614 ft., Wilcox 2,750 ft., Midway 5,370 ft., pumping 64 bbl. per day and 96 bbl. salt water, gravity oil 38.5°, T.D. 5,490 ft.

Fields

South Bellevue, Bossier Parish: Oscar Donley et al 1 Howell, NW NW 4-18n-11w, dry at 1,147 ft.

Haynesville, Claiborne Parish: Midstates Oil Corp. 1 R. P. Bond, NE NE 21-23n-8w, 767 bbl. at 5,335 ft.

Ohio Oil Co. 1 J. L. Garrett Acct. 4, NE NW 24-23n-8w, 26 bbl. in 1 hr. at 5,375 ft.

Ohio Oil Co. 1 F. M. Taylor Acct. 3, SW NW 13-23n-8w, 680 bbl. at 5,360 ft.

J. B. White et al 1 R. P. Bond, SW SW 15-23n-8w, 290 bbl. in 8 hr. at 5,305 ft.

Zenoria, La Salle Parish: Arkansas Fuel 3 M. L. Taylor, SE NE 25-9n-1e, 168 bbl. with 2 per cent salt water at 2,515 ft.

O'Meara Bros. 1 A. T. Dean, NW SW 24-9n-1e, 12 bbl., 30° oil and 1,250,000 cu. ft. gas, 2,700 ft.

Sandy Bayou: Carter Oil Co. D-3 Tensas-Delta, NE NW 36-6n-3e, abandoned location.

Nebo, La Salle Parish: H. L. Hunt F-89 Goodpine, NW SW 21-7n-3e, dry at 4,930 ft.

T. L. James & Co., Inc., 1 I. O. Swayze, NW SE 22-7n-3e, 192 bbl. at 3,670 ft.

W. O. Woodward 4 C. R. Coon unit, NE NW 11-7n-3e, 100 bbl., 20 per cent salt water at 4,063 ft.

ARKANSAS NEW LOCATIONS

Wildcats

Nevada County: M. E. Wakefield et al 1 Saunder-Rouse unit, SE NW 4-13s-22w.

ARKANSAS COMPLETIONS

Fields

Stephens, Columbia County: Haynes B. Ownby Drilling Co. 1 J. W. Smart, NW SE 12-15s-20w, 100 bbl. in 12 hr. at 3,443 ft.

MISSISSIPPI NEW LOCATIONS

Wildcats

Pearl River County: Placid Oil Co. 1 Dorothy Batson, SE SE 15-4s-16w.

Fields

Pickens-Sharpsburg, Madison County: Phillips Petroleum Co. 1 Gene, SW SE 4-11n-3e.

Phillips Petroleum Co. 2 John Whitworth, NW SE 4-11n-3e.

Phillips Petroleum Co. 3 John Whitworth, SW NE 4-11n-3e.

Phillips Petroleum Co. 4 John Whitworth, SW NW 4-11n-3e.

MISSISSIPPI COMPLETIONS

Wildcats

Sharkey County: E. C. Johnston and Sam Cook 1 Sam Klaus, NE NE 19-11n-7w, dry at 4,024 ft., top Clayton 3,326 ft., gas rock 3,336 ft. to 3,375 ft., Lower Cretaceous 3,375 ft.

Fields

Pickens-Sharpsburg, Madison County: Phillips 1 John Whitworth, SE NW 3-11n-3e, 344 bbl. per day with 44,300 cu. ft. gas at 4,846 ft.

Tinsley, Yazoo County: E. C. Johnston et al 14 Martin, SE NW 1-9n-3w, pumping 250 bbl. at 4,958 ft.

Atlas Oil Co. 1 McGowan & White, NW NE 20-10n-2w, dry at 5,033 ft.

E. C. Johnston et al 13 Martin, NW SE 1-9n-3w, pumping 275 bbl. at 4,961 ft.

M. Carl Jones 5 Walker, SW NE 2-9n-3w, pumping 14 bbl. in 1 hr., at 4,962 ft.

Charles A. Perkins 1 M. F. Sorrells, NW SE 32-10n-2w, dry at 6,500 ft.

ALABAMA COMPLETIONS

Clarke County: Ranger, Grubb & Hawkins 1 Scotch Lbr. Co., NE NW 14-10n-3e, dry at 4,043 ft.

California Fields

(Continued from Page 90)

versal Consolidated Oil Co. is abandoning 1 Ward in 27-3n-16w, as unproductive at 9,361 ft. The latter well, which showed up rather good several times during the course of work, failed to show production on a series of tests. Universal took over this lease following discovery of a second productive zone in the Aliso Canyon field by Tide Water Associated Oil Co. and started deepening operations where another operator had stopped work. Failure of this well to result in production still leaves Tide Water in sole possession of all the productive acreage in the Aliso Canyon field. Shell Oil Co., Inc., is testing out a shallow showing in its 2-1 Mission in this region preparatory to abandonment but the outlook for production is not any too good. This wildcat was drilled to 6,978 ft. and has been plugged back to 2,141 ft.

Rincon Deep Test Resumes Drilling

In the Rincon field of Ventura County, Chanslor-Canfield Midway Oil Co. has resumed drilling operations in 10-C Hobson following the landing of 16-in. surface pipe. This well, which is being drilled with electricity, is a projected deep test and may be carried down to 13,000 or 14,000 ft. depending upon what is found in the lower part of the hole after it passes 10,000 ft. Attempts of this company to develop deeper production have so far proved unsuccessful down to the depth drilled, slightly below 10,000 ft., although considerable oil sand has been cored. Unfavorable porosities and permeabilities prevented the development of large flowing production. The Rincon field is located at the extreme western end of the major Ventura Avenue anticline and at the point where it plunges beneath the Pacific Ocean. Rincon and Elwood in the coastal area are only producing limited amounts of oil due to disrupted transportation and the Capitan field which is located adjacent to tidewater has been shut down entirely and will probably remain on the suspended list for some time to come. Republic Petroleum Co. is preparing to resume drilling operations in 1 Price in the Gato Ridge field following the cementing of a string of casing at 3,793 ft. This well is bottomed at 4,994 ft. and has showed considerable oil sand at frequent intervals during the bottom 1,200 ft. It is thought sufficient oil sand has been found to expect production and if this is the case the well will greatly extend the productive limits of the Gato Ridge field which produces a heavy grade of crude oil.

COASTAL DISTRICT COMPLETIONS

Aliso Canyon wildcat district, Los Angeles County: Tide Water Associated Oil Co. 1 Mission, 26-3n-16w, dry, T.D. 9,291 ft., perf. 8,990-9,288 ft., logged hard gray sand showing oil below 8,988 ft., swabbed water and trace of oil on production test, gun perf. 3,540-3,620 ft. tested wet, gun perf. 3,150-3,225 ft. tested wet.

Oak Canyon, Los Angeles County: Western Gulf Oil Co. 1 U.S.L.-Gilmour, 32-5n-17w, flowed 470 bbl., 34.9-gravity, 1.3 per cent cut, 164,000 cu. ft. gas, 18/64-in. bean, pressures 620/1,060 lb., T.D. 7,481 ft., perf. 7,200-88 ft., completed in Lechler zone of Miocene age.

Requests for Exception in Turnbull Canyon Field Rejected

The OPC rejected Paul Getty's request for an exception to M-68 in order to be able to drill one well on approximately 1 acre in the Turnbull Canyon field of Los Angeles Basin and thus for the present Mr. Getty will not be able to proceed with drilling operations despite the fact that all necessary equipment was available. Continental Oil Co. discovered the Turnbull Canyon field and its leases include practically all of the potentially productive acreage as it appears at present. It certainly would not be equitable to hold Continental Oil Co. to a 40-acre spacing and permit Mr. Getty to drill on the basis of one well to 1 acre. The most satisfactory method of handling the matter is to pool 39 acres of Continental's leases with Mr. Getty's 1 acre to form a 40-acre drilling block for the duration of the present emergency. The matter could be handled in a different manner after hostilities are over if desired. In the meantime, Continental Oil Co. is preparing to start drilling operations on its third well in the field.

Texas Co. is making good progress with its wildcat in the La Mirada district of Orange County but it may be another 30 days before the bit reaches its objective. This wildcat is being drilled on the McNally property in 15-3s-11w, due west of the West Coyote field and the present well is the second to be drilled by Texas on the property.

LOS ANGELES BASIN COMPLETIONS

Wilmington, Los Angeles County: Wilmington Pacific Petroleum Co. 2 Meeker, 32-4s-13w, pumped 180 bbl., 13.4-gravity, 4 per cent cut, T.D. 3,640 ft., 80-mesh gravel-packed perf. 2,690-2,875 ft., 2,955-3,200 ft., 3,370-3,640 ft., completed in Ranger zone.

Nebraska-Missouri

(Continued from Page 91)

W½ NW SE 36-3n-16e, the Barada pool, with pipe set at 2,438 ft. Its 6 Roesch in NW SW 36-3n-16e of the same pool was drilling at 965 ft. Ike Taylor was ready to test Hunton in 1 Zentner in the Barada pool, W½ SW SE 36-3n-16e.

NEBRASKA COMPLETIONS

Wildcat, Adams County: Ohio Oil 1 Bauder, SE SW 35-5n-9w, dry, T.D. 4,125 ft., Dakota 740 ft., Council Grove 1,560 ft., Pennsylvanian 1,915 ft., Topeka 2,255 ft., Lansing 2,503 ft., Kansas City 2,570 ft., Bronson 2,725 ft., Marmaton 2,815 ft., Cherokee 2,920 ft., Devonian 3,220 ft., Silurian 3,340 ft., Ordovician 3,565 ft., Arbuckle 3,865 ft., granite 4,103 ft.

Wildcat, Sherman County: Carter Oil 1 Stocker, NW NW 21-13-13w, dry, T.D. 3,405 ft., Dakota 1,220 ft., Lansing 2,598 ft., Viola 3,125 ft., Simpson 3,219 ft., Arbuckle 3,334 ft.

Barada, Richardson County: Skelly 1 Merz, E½ NE NE 35-3-16, recompleted, pumped 181 bbl. in 16 hr., Hunton 2,442-52 ft. and 2,459-65 ft., T.D. 2,505 ft.

Illinois Basin Development Celebrates Sixth Birthday

MATTOON, Ill.—The current and highly successful Illinois oil development celebrated its sixth birthday this week. The discovery of three widely separated pools in 1936 and early 1937, touched off a drilling campaign that has resulted in the completion of almost 10,800 producing wells in southern Illinois since January 1, 1937, making oil the state's richest mineral industry.

The herald of the new oil era was the Bartelso Oil & Gas Co. 1 Trame, a wildcat test near Bartelso in Clinton County, completed successfully in a shallow-sand formation April 20, 1936. Neither this strike nor the following two in Marion and Clay counties early in 1937 created any but local excitement. However, when the Pure Oil Co. completed 1 Bunny Travis in the Clay City field in May 1937, as the largest well ever drilled east of the Mississippi River, the nation's oil sptlight turned to Illinois.

Prospective Pool Openers Still Uncompleted

Prospects of the nearly 100 wildcats now drilling in Illinois appeared none too good last week. Two of these tests have been showing as possible pool openers for the past few weeks but have not yet been completed. The Deaton-Bears 1 Belle Howard, NE NE NW 5-1s-3e, pool-opening well 4 miles south of the Dix field in Jefferson County, has been given a second acid treatment of 2,000 gal. at 2,621-26 ft. in the McClosky and is still testing. After a 500-gal. treatment the well swabbed 220 bbl. in 14 hours. It produced 200 bbl. a day natural.

The other possible pool opener, Steele et al 1 Clarence Couch, 330 ft. from the south line, 1,160 ft. from the east line, 6-1s-11e, Edwards County, is preparing to test productivity of the McClosky. Casing was set to that formation after a drill-stem test recovered 120 ft. of oil-cut mud and no water.

The peculiarities of Illinois geology upon which Gov. Dwight H. Green will base a plea for relaxation in the state of the nationally enforced OPM spacing requirements were brought home last week when Louis Lilly 1 Etta Bell, 1 mile east of Centralia, failed to pick up a recognizable Stein or Benoist formation at a total depth of 1,825 ft. Just 40 acres to the northeast, Lilly Leonard estate was producing 66 bbl. on pump from 9 ft. of heavily saturated Stein sand topped at 1,665 ft.

At last reports, electric log was being run at 1 Bell preparatory to abandonment. The test is located in NE NE SE 17-1n-1e.

At 1,674 ft., last depth that the Stein could be encountered and production from the formation still be feasible, operators reported they were drilling through hard shale. At 1,694 ft. there was a water sand which was believed to be a formation other than the Stein. There was no Benoist at 1,825 ft. after that formation was expected near 1,801 ft.

ILLINOIS COMPLETIONS

Wildcats

Bond County: Shea 1 State Bank, SW NE SW 4-5n-2w, dry at 1,250 ft., Golconda 873 ft., Cypress 916 ft., Paint Creek 1,059 ft., Benoist 1,067 ft., Ste. Genevieve 1,155 ft., Fredonia 1,182 ft., McClosky 1,203 ft., St. Louis 1,244 ft.

Clay County: Shaffer & Toller 1 Large, NW SE 24-3n-6e, dry at 3,107 ft., Glen Dean 2,470 ft., Golconda 2,555 ft., Barlow 2,640 ft., Paint Creek 2,835 ft., Benoist 2,853 ft., Renault 2,888 ft., Ste. Genevieve 2,981 ft., Fredonia 3,025 ft.

B. F. Williams et al 1 Witte, SE SE 5-5n-6e, dry at 2,751 ft., Menard 1,984 ft., Vienna 2,089 ft., Glen Dean 2,187 ft., Golconda 2,248 ft., Barlow 2,348 ft., Benoist 2,515 ft., Ste. Genevieve 2,617 ft., McClosky 2,672 ft.

Crawford County: Roy Powers 1-A Park, N½ SW NW 20-8n-13w, dry at 1,170 ft.

Effingham County: Roy Powers et al 1 Lohman, E½ SE SW 28-9n-6e, dry at 2,466 ft., Glen Dean 1,930 ft., Barlow 2,045 ft., Benoist 2,202 ft., Ste. Genevieve 2,328 ft., Fredonia 2,368 ft.

Hamilton County: Reward 1 C. Johnson, W½ SE NE 3-6s-7e, dry at 3,407 ft., Glen Dean 2,607 ft., Cypress 2,947 ft., Paint Creek 3,050 ft., Benoist sand 3,100 ft., Renault 3,112 ft., Aux Vases 3,175 ft., Aux Vases sand 3,191 ft., Ste. Genevieve 3,238 ft., St. Louis 3,400 ft.

Jefferson County: Seaboard 1 F. Yeager, NW SE NE 28-3s-4e, dry at 3,195 ft., Kincaid 1,972 ft., Menard 2,219 ft., Tar Springs 2,334 ft., Glen Dean 2,448 ft., Golconda 2,523 ft., Barlow 2,669 ft., Cypress sand 2,680 ft., Paint Creek 2,890 ft., Renault 2,942 ft., Aux Vases 2,981 ft., Ste. Genevieve 3,005 ft., McClosky 3,038 ft., St. Louis 3,171 ft.

Marion County: Louis Lilly 1 Leonard estate, NE SE NE 17-1n-1e, pumped 55 bbl., 15-qt. shot 1,671-76 ft., sand 1,667-76 ft., T.D. 1,676 ft.

Richland County: Pure 1-B Murvin, NW NW 27-3n-9e, pumped 165 bbl. natural, Cypress sand 2,647 ft., pay 2,703-10 ft., T.D. 2,710 ft.

St. Clair County: C. W. Young 1 Timpner, NW SW NE 29-3s-6w, dry at 650 ft., Glen Dean 315 ft., Benoist 610 ft.

Wayne County: Bell Bros. et al 1 H. B. Wilson, SW NW 18-1s-5e, dry at 3,102 ft., Menard 2,147 ft., Tar Springs 2,286 ft., Glen Dean 2,369 ft., Golconda 2,453 ft., Barlow 2,575 ft., Cypress 2,605 ft., Paint Creek 2,742 ft., Benoist 2,798 ft., Renault 2,843 ft., Aux Vases 2,872 ft., Ste. Genevieve 2,920 ft., Fredonia 2,970 ft., McClosky 3,031 ft.

New Penn 1 T. Simpson, NE SE 21-2s-9e, dry at 3,410 ft., Glen Dean 2,695 ft., Barlow 2,902 ft., Aux Vases 3,216 ft., Ste. Genevieve 3,268 ft., Rosiclare 3,298 ft., McClosky 3,337 ft.

New Penn 1 L. P. Harris, W½ NW NE 28-2s-9e, pumped 201 bbl., 2,000 gal. acid, Ste. Genevieve 3,265 ft., saturation 3,277-82 ft., T.D. 3,311 ft., *pool opener.*

Fields

Dix, Marion County: C. F. Frazier et al 1 McBride, SW SW 34-1n-2e, pumped 5 bbl. oil and 60 bbl. water, 3-qt. shot on bottom, Benoist 1,972 ft., T.D. 1,980 ft.

Dundas, Richland County: Pure 1-A Roberts, SW NW 12-4n-9e, pumped 45 bbl. oil and 16 bbl. water, 5,000 gal. acid, Fredonia 2,917 ft., pay 2,922-30 ft., T.D. 2,970 ft.

Johnsonville, Wayne County: Eason et al 1 Powless NE SW 4-1s-6e, dry at 3,278 ft., Glen Dean 2,584 ft., Golconda 2,692 ft., Barlow 2,792 ft., Aux Vases sand 3,068 ft., Ste. Genevieve 3,133 ft., Fredonia 3,201 ft.

New Harmony, White County: Superior 2 B. S. Collins, SE SE SE 22-4s-14w, pumped 51 bbl. in 11 hr., perf. in Cypress 2,585-2,600 ft., old well worked over, T.D. 2,930 ft.

Sun P-1 E. R. Greathouse, NW SE 33-4s-14w, gas-input well, Hardinsburg 2,348 ft., Barlow 2,521 ft., Cypress 2,572 ft., Paint Creek 2,633 ft., Benoist 2,690 ft., T.D. 2,729 ft.

Superior 33 E. M. Fitten, SW NE SW 23-4s-14w, pumped 40 bbl. oil and 40 bbl. water, 100-qt. shot 2,854-80 ft., perf. 2,590-2,603 ft., Aux Vases 2,854-70 ft., Cypress sand 2,590-2,610 ft., T.D. 2,965 ft.

North Albion, Edwards County: Superior 2 L. L. Thread, S½ NE NE 31-1s-11e, location abandoned.

Rural Hill, Hamilton County: Shell 6 C. A. Smith, SW SE NE 13-6s-5e, location abandoned.

Simms, Wayne County: Texas 2 W. Harlin, W½ SE SE 21-1s-6e, dry at 3,306 ft., Glen Dean 2,600 ft., Golconda 2,680 ft., Barlow 2,782 ft., Paint Creek 2,926 ft., Renault 3,056 ft., Aux Vases 3,092 ft., Ste. Genevieve 3,133 ft., Rosiclare 3,150 ft., Fredonia 3,193 ft., McClosky 3,228 ft., St. Louis 3,296 ft.

Texas 1 Warren, W½ NW NW 27-1s-6e, pumped 317 bbl., perf. 3,190-3,200 ft., 1,500 gal. acid, Aux Vases sand 3,066-94 ft., McClosky 3,192-3,200 ft., T.D. 3,210 ft.

Walpole, Hamilton County: Texas 3 R. L. McGill, W½ NW SW 27-6s-6e, pumped 90 bbl., Aux Vases sand 3,082-3,102 ft., T.D. 3,102 ft.

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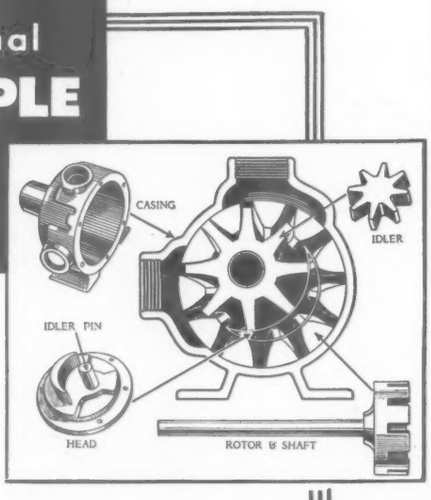

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ROCKY MOUNTAIN AREA

Discoveries Reported on Pilot Butte and Sherrard Domes

By T. R. INGRAM

DENVER, Colo. — The prosaic routine in the Rocky Mountain area for the past few weeks was broken this week with two discoveries and with reports of several important wildcats to be drilled.

The most important discovery was made in the old Pilot Butte field, Fremont County, Wyoming, in the Superior Oil Co. 1 Tribal, SW SE SW 15-3n-1w, a joint operation with the British American Oil Producing Co. It was drilled to 6,775 ft. and tested the Amsden sand, topped at 6,704 ft. It then plugged back to the 7-in. at 6,446 ft., in the base of the Tensleep and this week began testing that horizon through perforations. While it was stated that it will make a good well, no official report as to what it was doing on the test was released. From unofficial reports, however, it was said to have flowed around 25 bbl. an hour while cleaning itself and that the oil is reported to test around 28° gravity. The formation is lime and acidization probably will improve its performance. Data on the well will be released after it is completed. The field has produced oil from the upper horizons for a number of years and the Kinney-Coastal Oil Co. drilled two tests to the Dakota series, one of which was completed for 83,000,000 cu. ft., and the other for 2,000,000 cu. ft. This is the first test to the Tensleep. The companies acquired 2,470 acres of tribal and allotted lands at auction last year in 14 parcels scattered over the structure and also have a large acreage acquired from other interests.

The other discovery was on the Sherrard structure, Carbon County, Wyoming, in Sinclair-Wyoming 1 Mary Carter, NE SE SE 31-25n-88w, which was completed in the Dakota series for 8,000,000 cu. ft. of gas after plugging back from 5,185 ft., 138 ft. in the Tensleep, to 4,433 ft. The 7-in. was perforated with 80 shots at 2,950-85 ft. and 80 shots at 3,024-64 ft. There was a show of oil in the top of the Tensleep followed by water. Geophysical surveys prior to spotting the test showed two highs on the axis and location was made on the southeast plunge of the anticline. Another test will be drilled on the north high the coming summer. The company has a solid block of 11,000 acres unitized, covering both highs. The test attracted considerable attention due to its location in the Lost Soldier basin where prolific production in the Tensleep has been developed at Wertz, Mahoney dome, and Lost Soldier. It is only 6 miles southwest of Mahoney dome.

Big West Oil Co. 1 State, C SE 6-34n-4w, Midway district, west of the Kevin-Sunburst field, which was dry, was located ¾ mile southeast of its 1 Dahlquist, a gas discovery last December, which gaged 6,600,000 cu. ft. in Cut Bank sand

Santa Rita 17 Tribal, on the west side of the Cut Bank field, which had only a light show of oil in the Sunburst and upper Cut Bank sands, failed to find any lower Cut Bank sand in place and was abandoned. It is a little less than ½ mile south of 16 Tribal which swabbed and flowed 587 bbl. the first 24 hours.

The Stanolind Oil & Gas Co. has changed the location of its important wildcat in Prowers County, southeastern Colorado, from the C SW SE 32-24s-41w, to the C SW NE of the same section.

Another wildcat rumored is in Uintah County, eastern Utah, 7 miles northeast of Vernal in Township 4s-20e, to be drilled this summer by the Union Oil Co. of California. It is northwest of the Ashley Valley district where gas was produced for commercial use for a number of years from the Morrison sand, but which was never tested below the Nuggett, and in the same area (28-3s-21e) where the Maud Ellen Oil Co. had a show of oil in the Pennsylvanian at 2,314 ft. several years ago. It also is due west from the Dinosaur National Monument, which contains what is said to be the largest known deposit of dinosaur fossils as well as fossils of many other types.

WYOMING COMPLETIONS

Sherrard field, Carbon County: Sinclair-Wyoming 1 Mary Carter, NE SE SE 31-25n-88w, T.D. 5,185 ft., P.B. to 4,433 ft., perf. with 80 shots at 2,950-85 ft. and 80 shots at 3,024-64 ft., gaged 8,000,000 cu. ft. from Dakota sand.

MONTANA COMPLETIONS

Cut Bank field, Glacier County: Santa Rita Oil & Gas 17 Tribal, C SW SE 3-35n-6w, dry, T.D. 3,059 ft., light show oil in Sunburst sand at 2,928-94 ft., slight show oil in upper Cut Bank at 2,996-3,025 ft., no lower Cut Bank, 60-qt. shot.

Kevin-Sunburst field, Toole County: Big West Oil 1 State, C SE 6-34n-4w, dry, T.D. 2,295 ft., Madison 2,285 ft., small show oil 2,990-95 ft., acidized 1,000 gal. and 500 gal.

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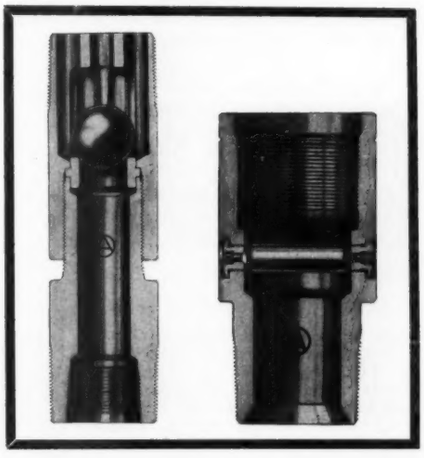

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INDIANA, OHIO, KENTUCKY

Posey County Wildcat Tests Aux Vases and McClosky

EVANSVILLE, Ind.—Sun Oil Co. has set casing to test Aux Vases and McClosky saturation at 1 Byrd, NE SE 4-8s-14w, a wildcat in the southern part of Posey County, 4 miles north of Kentucky. On a 1-hour drill-stem test of the Aux Vases with packer set at 2,602 ft. the company recovered 30 ft. of oil and 120 ft. of oil-cut mud. McClosky pay was at 2,649-53 ft. The section yielded about 90 ft. of fluid on drill stem. Total depth is 2,653 ft. No. 1 Byrd is about 1½ miles north of production in the College field.

A pumping unit is being installed at Paul Rossi 1 E. Mauzy, NE NW NW 8-7s-12w, pool-opening Aux Vases well 5 miles east of Mount Vernon. The well produced 420 bbl. of oil in 30 hours on swab tests at 2,609-17 ft. It is producing natural. An east offset to the discovery, Gulf Refining Co. 1 Frank Schutte, NE NW 8-7s-12w, is drilling below 320 ft. after setting surface casing at 190 ft.

Mansfield Producer Near Completion at Mount Vernon

Carter Oil Co. 4 J. O. Erwin, NW NE NE 1-7s-14w, in the Mount Vernon field, is showing for a 200-bbl. well in the Mansfield sand at 1,273-1,309 ft. following a 60-qt. shot. The well, being put on pump, is the second Mansfield sand producer in the field and offsets the first completion in that formation, Carter 1 O. Erwin, also about a 200-bbl. well. There are two other productive zones in the pool, the Waltersburg and Cypress sands.

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OHIO

ZANESVILLE, Ohio.—The Clayton pool in Perry County yielded three Clinton sand oil producers with initial production of 469 bbl. The wells are the first in the area to be completed under authority of exceptions filed under M-68.

Two fair gassers in the Oriskany horizon were reported in the Mayfield Village pool, Cuyahoga County, the best one gaging better than 3,000,000 cu. ft. of gas open flow. New work reported during the week consisted of 19 new tests.

OHIO COMPLETIONS

Ashland County, Mohican Township: Ohio Fuel 1 John Crumlick, Sec. 22, dry, Clinton, T.D. 2,940 ft.
Athens County, Bern Township: Bern O. & G. Co. 4 Paul Wogan, dry, Maxon (water), T.D. 1,064 ft.
Cuyahoga County, Mayfield Village: Benedum-Trees 1 Julia Fish, Lot 20, 3,130,000 cu. ft. gas, Oriskany 1,898-1,903 ft.
Benedum-Trees 1 M. G. Homes, Lot 20, 2,000,000 cu. ft. gas, Oriskany 1,800-70 ft.
Gallia County, Cheshire Township: Ohio Fuel 1 M. K. Swisher, Sec. 13, 50,000 cu. ft. gas, shot, second Berea, T.D. 1,621 ft.
Knox County, Howard Township: H. E. Perkins 1 Pius Engle, Sec. 9, dry, Clinton, T.D. 2,800 ft.
Union Township: Ohio Fuel 1 H. G. Hammond, Sec. 24, 1,500,000 cu. ft. gas, Clinton, T.D. 2,884 ft.
Licking County, Newark Township: Allen Willey 1 Edward Daniels, W second quarter, dry, Clinton, T.D. 2,550 ft.
Monroe County, Green Township: E. O. Lucas 1 John Bondi, SW Sec. 34, dry, show gas, Berea grit, T.D. 2,250 ft.
Morgan County, Marion Township: Crowley et al 1 Dale Woodyard, Sec. 33, 120,000 cu. ft. gas, shot, Berea, T.D. 1,444 ft.
Noble County, Noble Township: Fassett Oil Co. 10 John Hayes, Sec. 34, show oil, plugged, Maxburg 700-ft., T.D. 631 ft.
Perry County, Clayton Township: Preston Oil 4 William Thompson, Sec. 8, 287 bbl., shot, Clinton 3,234-88 ft., T.D. 3,295 ft.
Preston Oil 2 Margaret Shaw, Sec. 8, 80 bbl., shot, Clinton 3,317-54 ft., T.D. 3,368 ft.
Palm Oil Corp. 3 Jesse W. Amerine, NE Sec. 9, 102 bbl., Clinton sand, T.D. 3,285 ft.
Summit County, Richfield Township: Wiser Oil Co. 1 Stauffer estate, Sec. 16, 20 bbl., 230,000 cu. ft. gas, shot, Oriskany 2,070-2,106 ft., Clinton 3,525-65 ft., T.D. 3,565 ft., P.B. to 2,115 ft.
Washington County, Barlow Township: Porter et al 2 Charles Male, Sec. 7, 200,000 cu. ft. gas, Maxburg 800-ft., T.D. 1,377 ft.
Warren Township: Anderson et al 1 Charles W. Edgas, Sec. 24, 40,000 cu. ft. gas, shot, Berea, T.D. 2,120 ft.
Wesley Township: Orndoff & Burt 1 J. M. Fawcett, Fraction 32, show gas, plugged, Maxon (water), T.D. 1,046 ft.

EASTERN KENTUCKY

ASHLAND, Ky.—Four gas wells were reported completed in eastern Kentucky this week and general drilling operations are holding a steady course. One gas well was recompleted this week and a number of old wells, being drilled deeper, are near total depth.

Reports received here say Green Rice has completed his well on the A. B. Hoenig land in Magoffin County. The well was drilled to Trenton but had only a show of gas. It was plugged back to Weir and shot and has an estimated production of 10 bbl. of oil daily.

The four gas wells had a combined daily open flow of 1,892,000 cu. ft. of gas and were drilled in by the Kentucky-West Virginia Gas Co.:

Pike County: 643 J. M. Taylor, old well drilled deeper, Brushy Fork, shale, 119,000 cu. ft. gas open flow, shot, T.D. 2,867 ft.
651 Adron Lowe, Lowe Branch of Johns Creek, 267,000 cu. ft. gas open flow, shale and Big lime, T.D. 3,087 ft.
5360 John Bevins, Lower Pompey Branch, shale, 169,000 cu. ft. gas open flow, shot, T.D. 3,652 ft.
5365 Milton Adkins, Upper Chloe Creek, Big lime, 1,347,000 cu. ft. open flow, T.D. 4,008 ft.

Southwest Texas

(Continued from Page 95)

of the well is 5,552 ft. This is believed to be the first well in the field to be dual completed. The well is located 1,320 ft. west of the company's 7 South Texas Syndicate.

SOUTHWEST TEXAS COMPLETIONS

Wildcats

Goliad County: Magnolia 1 Wilkerson, dry, T.D. 5,400 ft.
J. M Wren 1 Yanta, dry, T.D. 4,510 ft.
Nueces County: W. B. Osborn 1 Olive Bird, dry, T.D. 7,148 ft.
Welington 1 Michalk, dry, T.D. 7,003 ft.

Fields

Agua Dulce, Nueces County: Richardson 1 Beatty, gas well, no gage, perf. casing 6,998-7,020 ft., T.D. 7,084 ft.
Ben Bolt, Jim Wells County: Heard & Heyser, 181 bbl., ¼-in. choke, perf. casing 5,245-52 ft., T.D. 5,256 ft.
Greta, Refugio County: Monday Oil Co. 3 Heard, 84 bbl., ⅛-in. choke, perf. casing 4,387-95 ft., T.D. 4,446 ft.
McFaddin, Refugio County: Colton & Colton 2 Fagan, dry, T.D. 5,623 ft.
Cox & Hamon 1 Marberry, 109 bbl., ⅛-in. choke, perf. casing 5,632-37 ft., T.D. 5,664 ft.
Odem, San Patricio County: Seaboard 5-C Welder, 81 bbl., ⅛-in. choke, perf. casing 5,285-87 ft., T.D. 5,387 ft.
Richard King, Nueces County: Southern Minerals 25 King, 65 bbl., 7/64-in. choke, perf. casing 5,594-5,604 ft., T.D. 5,604 ft.
South La Rosa, Refugio County: Hewitt & Dougherty 6-A Rooke, 357 bbl., ¼-in. choke, perf casing 7,139-43 ft., T.D. 7,656 ft.
Stratton, Nueces County: S. E. Wilson 2-B Rivers, 141 bbl., ⅛-in. choke, perf. casing 5,724-34 ft., T.D. 5,950 ft.
Southern Minerals 36 Stratton, 70 bbl., 7/64-in. choke, perf. casing 6,631-47 ft., T.D. 6,665 ft.
Chicago Corp. 35 Wardner, 41,000,000 cu. ft. gas upper sand and 31,000,000 cu. ft. gas lower sand, perf. casing 6,555-6,619 ft. and 6,630-67 ft., T.D. 6,726 ft.
Chicago Corp. 38 Wardner, 70,000,000 cu. ft. gas upper sand, 132,000,000 cu. ft. gas lower sand, perf. casing 6,445-6,518 ft. and 6,570-6,605 ft., T.D. 6,737 ft.
Yorktown, De Witt County: Adams Oil & Gas Co. 1 Berck, 6 bbl. 62.8-gravity distillate per hr., ⅜-in. choke, perf. casing 7,192-7,204 ft., T.D. 9,150 ft.

LAREDO DISTRICT

Wildcats

Duval County: Bennett Production Co. 3 Benavides, dry, T.D. 2,930 ft.
Live Oak County: Henderson Coquat 1 B. G. Riser, dry, T.D. 5,125 ft.
McMullen County: Argo 1 Fryette, dry, T.D. 3,157 ft.
Webb County: Killam & Salinas 1 Bruni, dry, T.D. 1,111 ft.

Fields

Aviator, Webb County: O. W. Killam 1 Bruni, dry, T.D. 2,005 ft.
Colorado, Jim Hogg County: Humble 63-B King, 104 bbl., ¼-in. choke, sand 3,040-52 ft., T.D. 3,052 ft. Humble 62-B King, 170 bbl., ¼-in. choke, sand 2,865-77 ft., T.D. 2,879 ft.
Driscoll, Duval County: Continental 77-A Driscoll, dry, T.D. 3,310 ft.
Garcia, Starr County: Sun 2-A Garcia Land & Livestock Co., 166 bbl., 9/64-in. choke, sand 3,766-68 ft., T.D. 3,768 ft.
Rancho Solo, Duval County: Wheeler & Bunn 8-B Peters, 70 bbl., pumping, perf. casing 1,873-79 ft., T.D. 1,890 ft.
Sun, Starr County: Sun 4 Margo, 58 bbl., 9/64-in. choke, sand 4,207-15 ft., T.D. 4,695 ft.
Humble 1-B Los Retaches, 45 bbl., ⅛-in. choke, sand 4,646-54 ft., T.D. 4,660 ft.

SOUTH CENTRAL TEXAS DISTRICT

Fields

Pendencia Creek, Dimmit County: Wellington 2-B Sullivan, 1,000,000 cu. ft. gas, ⅜-in. choke, perf. casing 1,886-95 ft., T.D. 2,824 ft.

MICHIGAN OPERATIONS

Good Producer in South End Of Headquarters Field

By OTTO C. PRESSPRICH

SAGINAW, Mich.—While Michigan crude oil was being rushed eastward at a rate approaching the 10,000-bbl.-a-day figure to help ease the eastern seaboard's gasoline shortage, field developments continued brighter last week.

There was encouragement in the prospects for the continued development of the south part of the Headquarters pool as Pure Oil Co. brought in 1 McCann in Section 3, Franklin Township, Clare County, for initial production of 180 bbl. an hour. William P. Shoemaker was getting production from a Lake County wildcat and there was considerable interest evident in a Wayne County wildcat test which got a small amount of oil from a location near the Detroit metropolitan area.

Fourteen completions were reported last week, including six producers, six dry holes and two Taggart Brothers Co. projects which resumed natural gas development. One location was abandoned.

Pure 1 McCann is the fourth producer in the southern part of the Headquarters pool resulting from a Roscommon County discovery last year. Nearby in Richfield Township, Roscommon County, Sun Oil Co. 1 St. Helen was in the Monroe strata and in Roscommon County Sun Oil A-2 State, farthest west test in Headquarters field, was drilling to Dundee after getting water in the Traverse. Racine Oil Co. had started a wildcat test in West Nestor Township, Roscommon County. In Richmond, Osceola County, Pure Oil completed 1 Carney for initial potential of 1,239 bbl. a day, second best mark for the week. Taggart's new gas wells are in Osceola Township, Osceola County, one rating better than 3,650,000 cu. ft. per day.

Wildcat failures include Robert W. Atha 1 Carter in North Porter Township, Cass County. The test got a show of oil but acidizing failed to increase yield to warrant commercial completion and the test was abandoned after the hole was plugged back to 952 ft. from 958 ft. Other failures were located in Watson Township, Allegan County, Marshall of Calhoun, Polkton of Ottawa and Bangor of Van Buren.

Three new wells are starting in Arenac County as a result of the Major-McClanahan recent strike in Section 36, Adams Township. The Adams well was producing better than 300 bbl. a day from the Monroe formation. A mile east of the old Adams field, the well is the first big producer from a 4,200-ft. depth.

Production was averaging better than 100 bbl. a day from the Shoemaker 1 Matson discovery in Sauble Township, Lake County. There was some water after acidizing. As a result of the strike, Gordon Oil Co. is drilling 1 Brazars ½ mile northwest and Charles W. Teater has started drilling to the north. Two other locations have been staked.

Drilling permits for the year total 136, as 15 more were issued during the past week by the state Conservation Department. Four permits are for tests in Arenac County, three for Allegan, two for Osceola, two for Van Buren, one each for Mecosta, Roscommon, Mason and Isabella.

MICHIGAN COMPLETIONS

Allegan County, Trowbridge Township: Earl H. Gromer 1 Dreiske & Bridgeman communitized, NE NW NW 32-1n-13w, pumping 5 bbl. and salt water, acidized, T.D. 1,358 ft.

Watson Township: Charles W. Cook 1 Hellinger, NE NE NW 33-2n-12w, wildcat test, dry, T.D. 1,517 ft.

Bay County, Monitor Township: Gulf Refining Co. 1 Kircher, C S½ SE NE 2-14n-4e, pumping 50 bbl., acidized, T.D. 2,896 ft.

Calhoun County, Marshall Township: Continental Oil Co. 1 Bonnett, E½ SE SW 8-2s-6w, wildcat test, dry, T.D. 4,019 ft.

Cass County, North Porter Township: Robert W. Atha 1 Carter, NW SW SW 6-7s-13w, wildcat test, completed as dry hole after getting show of oil and acidizing, T.D. 952 ft., P.B. from 958 ft.

Clare County, Franklin Township: Pure Oil Co. 1 McCann, W½ NW Frl. ½ 3-20n-3w, 180 bbl. first hr., natural, T.D. 3,380 ft.

Winterfield Township: Turner Petroleum Corp. 1 Tope, C W½ NE SW 33-20n-6w, dry hole, T.D. 4,107 ft.

Lake County, Sauble Township: William P. Shoemaker 1 Matson, C NE SE NW 16-19n-14w, wildcat, initial 316 bbl. a day, T.D. 2,114 ft.

Osceola County, Osceola Township: Taggart Bros. Co. 3 Becker et al, C SW 22-18n-8w, 310,000 cu. ft. natural gas, T.D. 1,477 ft.

Taggart Bros. 4 Arndt-Wirth, C SW Sec. 23, 3,650,000 cu. ft. natural gas, T.D. 1,425 ft.

Richmond Township: Pure Oil Co. 1 Carney, C N½ NW SE 5-17n-10w, initial potential 1,293 bbl. daily, T.D. 3,557 ft.

Ottawa County, Polkton Township: Southern Development and Associates Petroleum Co. 1 Burnell, NE SE SE 10-8n-14w, wildcat test, dry, T.D. 1,932 ft.

Van Buren County: Bangor Township: Circle Drilling Co. 1 Ulrath, SW SE SE 30-2s-16w, wildcat test, dry, T.D. 1,024 ft.

Bloomingdale Township: Fortney & Broughton 1 Blaka, SW NW SE 1-1s-14w, location abandoned.

Wayne County, Sumpter Township: Bonanza Oil & Gas Co. 1 DeRoy estate, C S½ SW SE 22-4s-8e, wildcat test, show of oil, acidizing to produce 5 bbl. oil, 75 bbl. of salt water, T.D. 2,564 ft.

CANADIAN FIELDS

Government Aid Given to North Turner Valley Test

By VICTOR LAURISTON

CHATHAM, Ont.—Crude and natural-gasoline production from all Alberta fields for the week ending April 6 averaged 28,659 bbl. daily compared with 28,621 bbl. daily the previous week and 26,654 bbl. daily the corresponding week last year. The daily average included 27,299 bbl. of crude and 1,084 bbl. of natural gasoline from Turner Valley and 276 bbl. of crude from outside fields. There were 208 producing wells, 41 drilling, 2 finished, 7 testing, 1 suspended, 1 resumed, 1 abandoned, 3 new wells spudded, and 3 drilling licenses issued.

Government Aids Deep Test

In North Turner Valley, Ace Royalties 2, LSD 10, 22-22-4w5, standing in lower Benton formation at 7,103 ft. will be deepened as a result of tax concessions agreed to by the federal government. Expenditures on completion of Ace 2 will be allowed as offsets on revenues of Ace 1 for income-tax purposes. A finance department statement says: "It is the view of the technical officers and the Department of Mines and Resources that the well having been drilled to the depth of 7,103 ft., it is still at a very considerable distance above the possible oil-productive horizons. This depth renders the situation in this area extremely critical owing to the fact that water instead of oil may be present in the horizons where oil occurs in the Turner Valley wells. It is considered, however, that the additional drilling contemplated will furnish definite information which will be of general value to those who are at present drilling or who contemplate drilling in the same area, which is outside of the proven Turner Valley field. If the information obtained as a result of the additional drilling proposed by the company indicates that oil is not likely to be found at reasonable depths in this area, then useless expenditure of money in other wells may be avoided, and thus made available for proving up other areas in Alberta where the chances of finding oil may be more favorable." The well is approximately 7½ miles north and 4 miles west of the most northerly producer in the field and would probably have to drill to 11,000 ft. to test the lime.

TURNER VALLEY LIME TESTS

North Turner Valley: Foothills Oil & Gas 12, LSD 4, 9-21-3w5, below 7,422 ft., Madison at 7,095 ft.

West Central Section: Gem Royalties 1, LSD 4, 36-19 3w5, T.D. 7,515 ft., Madison at 7,065 ft., acidizing and testing.

Southwest Petroleum 7, LSD 13, 8-19-2w5, T.D. 6,940 ft., Madison at 6,480 ft., acidizing and testing.

Royalite Oil 63, LSD 8-9, 7-19-2w5, below 7,075 ft., Madison 6,892 ft.

Limits of Turner Valley

The proven Turner Valley field now extends from Northwest-Hudson's Bay 6 producer, LSD 7, 8-18-2w5, on the south, to Atlas-British Dominion 2, LSD 4, 17-21-3w5, to the north, a distance of 18¾ miles. Drilling now in progress or planned will extend the active area a quarter mile to the south and a further 16 miles to the north into the Sarcee Reserve area. Drilling indicates the productive area is bounded on the east by a steep dip in the limestone and on the west by an oil-water contact around 4,500 ft. below sea level. The field varies in width up to about 2½ miles, with a general northwest-southeast trend, but crude production has not been proven quite continuous, nor is it certain that the productive structure will prove continuous to the most northerly point at which drilling has been undertaken. Some of the more northerly tests may be found off structure, but several tests north of the proven field have shown favorable structural conditions.

Shell Becomes Active

Shell Explorations (Alberta), Ltd., connected with the Shell Oil Co. of Canada, is planning to continue extensive geophysical work in a number of Alberta areas this season. Work was carried on last year by six survey parties with Alex Clark as chief geologist. Areas in which the company is interested include 120,000 acres in the Jasper Park Forest Reserve near Entrance; 240,000 acres east and west of Drumheller; 57,000 acres in the High River area, and 36,700 acres south of Cochrane. A survey party has already left for the Jasper Park area.

Test in Priddis Valley

An important test is being started by Northwest Co., subsidiary of Imperial Oil, on the Priddis Valley structure, flanking the North Turner Valley extension to the east. Northwest Co. 1 Priddis, LSD 7, 25-22-4w5, is between 2 and 3 miles east and a little north of Ace Royalties 2 deep test in a previously untested area. Preliminary work on location has already been started.

Tilley Operations

In the new Tilley field, eastern Alberta, Northwest Co. 2, LSD 4, 17-17-12w4, finished at 3,185 ft., is being held down to around 50 bbl. daily, with water content less than 2 per cent. Casing pressure is held at 2,000 lb. with tubing at 600, and gas-oil ratio is between 600 and 700 cu. ft. Northwest 4, LSD 5, 17-17-12w4, has spudded and is below 530 ft. and Northwest 3 has location in LSD 13, 17-16-12w4.

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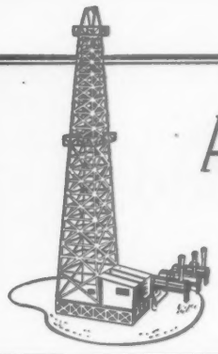


Among the Drilling

Illinois Congressman Wants M-68 Modified to Aid Contractors

DRILLING CONTRACTORS and their employes in Illinois have suffered serious results from Conservation Order M-68 it was declared in the House at Washington, D. C., last week by Rep. Laurence F. Arnold congressman from the twenty-third Illinois district.

"Drilling concerns," said the congressman, "have 'stacked' their rigs; drilling crews have disintegrated and gone into other states or other employment; many small cities in the oil-producing areas have declined 15 to 20 per cent in population and the owners of land are not able even to secure offset wells."

In efforts to obtain modification of M-68 in Illinois, Representative Arnold suggested to Coordinator Ickes that enough pipe could be reclaimed from Illinois wells, where production has ceased, to provide for the next 6 to 9 months' drilling operations on a more liberal spacing pattern.

The OPC requested that a survey and estimate of available material be submitted at the earliest possible time. Assembly of the desired information, Mr. Arnold said, would be completed next week when appeals for relief from the 40-acre spacing provision of M-68 will be renewed. The Illinois congressman is seeking a spacing modification that will permit development on a basis of one well to not more than 20 acres compared to the present 40-acre restriction.

Unrestricted operations is the only way to discover the small pools in Illinois, Representative Arnold argued. He pointed out that the relation of dry holes to oil wells had increased from 25 per cent in the 3 months before M-68 became effective to 48 per cent in March and 61 per cent in the first week of April. He blamed this trend, which was described as intolerable by all concerned, on the compulsion to drill on not less than 40 acres.

•

I. K. HOWETH opened a new gas-distillate field for Bee County, Texas, with the completion of his 1 H. Harris, located 7 miles north of Clareville. The well was drilled to the Pettus sand at 4,717 ft., and was plugged back and completed in the Hockleyensis formation at 3,700 ft.

C. E. STAR, Luling, Tex., was preparing to make a drill-stem test in his 1 Brown, a wildcat located 3 miles east of Luling, Caldwell County, Texas. The Edwards lime was topped at 3,255 ft., and was cored to a total depth of 3,274 ft.

E. A. GRAHAM, Corpus Christi, Tex., received contract for a 7,500 ft. wildcat from Phillips Petroleum Co. The well is to be drilled 2½ miles southwest of Corpus Christi, and is located on the Molina lease in the E. Villareal Survey.

H. C. COCHBURN, Houston, Tex., is scheduled to let contract for a 7,000-ft. wildcat to be drilled in the Laney City area, Wharton County, Texas. The well is 1 W. A. Moers, located in the Charles Hudson Survey.

PRINCE Brothers Drilling Co., Electra, Tex., have taken the contract to drill the first of seven scheduled tests on two leases in the World pool, Crockett County, Texas, which have been acquired by M. & M. Production Co. from Frank Black of Junction, Tex., early this year. There are 11 producing wells on these tracts at present. M. & M. also bought a 160-acre lease recently from Harris G. Eastham, Jr., of Midland, Tex., in the World pool.

M. & M. PRODUCTION Co., Abilene, Tex., has the contract to drill a wildcat in Upton County, Texas, for Porter Rankin of Midland, Tex., in Section 27, H.E.&W.T. Survey, Certificate 983, 1½ miles east and slightly north of Rankin. The well was drilling last week past 750 ft. in red beds.

FRED HYER, Fort Worth, Tex., has taken a deal with J. E. Fitz Patrick to complete 1 T. B. Pruitt, Section 23, Block 1, W.&N.W. Survey, northwestern Ward County, Texas. The well, started by Mr. Fitz Patrick, has been shut down for nearly a year at 1,510 ft. It will be carried to the Delaware formation at about 4,750 ft.

HOUSTON Drilling Co., Houston, Tex., has extended production in the Ganado field, Jackson County, Texas, about 1 mile south with the company's 1 Harmon, which is drilling below 6,400 ft., following a drill-stem test at 5,300 ft. The test recovered several hundred feet of oil and the well is drilling in search of a deeper sand.

H. H. HOWELL, Corpus Christi, Tex., opened a new sand on the northwest edge of the Ben Bolt field, Jim Wells County, Texas, with the recompletion of his 2 and 3 Whatley, both of which were originally completed in the discovery pay at 5,200 ft. The new production was developed from sand at 4,500 ft., which is expected to result in additional drilling for the field.

MARKLEY - BANKHEAD, Inc., Houston, Tex., has reached a depth of 10,220 ft. on its 1 Iberville Land Co., an outpost test located in the Happytown field, Iberville Parish, Louisiana. This well is being drilled on a farmout from Shell Oil Co., Inc., and is slated to be drilled to a depth of 11,000 ft. Another operation is reported in the University field East Baton Rouge Parish, Louisiana, for the Sugarfield Oil Co.

H. M. HARRELL, Shreveport, La., is slated to drill an important outpost test in the Bammel field, Harris County, Texas, as location has been made for 1 Graves, about 1 mile from production in the H.T.&B. Survey 8.

E. J. GRACEY, Houston, Tex., has started a new operation in the Lolita field, Jackson County, Texas, for Shell Oil Co., Inc.

BIG WEST Drilling Co., Dallas, Tex., was building derrick for immediate starting of Phillips Petroleum Co. 1 Benefield & Singleton, Wanhop Survey, southern Cass County, Texas. The well is an east offset to the John Messenger 1 Benefield & Singleton, discovery of the Kildare field, and is the third well to be started in the new area.

CRON & GRACEY, Houston, Tex., are using two of their rigs on workover jobs in the West Lake Verret field, St. Martin Parish and the South Houma field, Terrebonne Parish, Louisiana. Both operations are for Shell Oil Co., Inc.

GEORGE CALLIHAN, Albany, Tex., contractor, has a string of cable tools engaged on a wildcat test southeast of Winters, Tex., Runnels County, where he is exploring a lease obtained on a farmout from

Contractors

Shell Oil Co., Inc. The drillsite is 600 ft. from the north and 729 ft. from the east lines of the J. H. San Manuel Survey 72.

SMITH Brothers Drilling Co. has made location for 1 Williams, in C NW SW 3-8-3e, ¼ mile southeast of the discovery well of the Brooksville pool of Pottawatomie County, Oklahoma.

CROSBY Drilling Co., Houston, Tex., is drilling a new well in Starr County, Texas, in association with British American Oil Co. The operation is on the T. B. Slick fee land in Survey 230 and was formerly listed as T. B. Hoffer's project.

BIG WEST Drilling Co. is reported to be about to spot location for a 9,000-ft. test in Claiborne Parish, Louisiana, in 34-21-5.

PRICE Drilling Co. of Wichita Falls, Tex., is reported to have obtained contract for a wildcat operation in the extreme northwestern part of Midland County, Texas. Tentative location is C NE SE 29-40-1s on J. O. Nobles ranch.

J. G. GATTON, contractor, and B. Earl Smith & Co., both of Olathe, Kans., have commenced drilling on gas wells for Frederick J. Kasper and Sagamore Oil & Gas Co. in the Kaths field of Johnson County, Kansas. Locations are NE SE 29-13-12 and NW SE 32-13-22, respectively.

HALKO Drilling Co., Shawnee, Okla., has the contract for the Jordan Petroleum and Herman Hurst 1 Hood (Cheek) in C SE NW 35-10n-5e, in Seminole County, Oklahoma. The well was drilled at 4,235 ft., and the hole plugged back inside the pipe and casing perforated at 4,198 to 4,210 ft. Halko also has the contract for Jordan and Atlantic Refining Co. 1 Pecore, in NE NE SE 34-10n-3e, west of the Tecumseh Lake pool in Pottawatomie County, where derrick has been completed.

W. A. TAYLOR has the contract for a wildcat test 3 miles south of Wharton in Wharton County, Texas which will be drilled by H. C. Cockburn, Houston, Tex. The test is the 1 W. A. Moers, and is 660 ft. from the south and 330 ft. from the east lines of a 160-acre tract in the C. Hudson Survey.

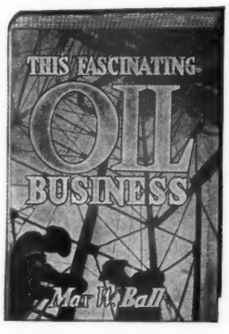
BIG WEST Drilling Co., Dallas, Tex., (Grady Vaughn and H. W. Klein) has been given the contract for Phillips Petroleum Co. 1 Bene field & Singleton, Wanhop Survey, an offset to the John Messenger discovery in south Cass County, Texas. Derrick is being built.

FALCON-SEABOARD Drilling Co. was moving in rotary for 1 Lizzie Grosz, 2½ miles southwest of Trapp pool, and 3½ miles due west of Susank, Barton County, Kansas.

Montana Operators Adopt Spacing Plan

MONTANA OPERATORS in the Cut Bank and Kevin-Sunburst fields at their meetings last week reached agreement on the spacing of wells which will be submitted to OPC for approval. The pattern recommended for adoption for Cut Bank provides for wells in the southeast corner of the 40-acre tracts. Kevin-Sunburst offered a more difficult problem due to local conditions governing the finding of oil in the contact, in breaks in the lime, and the use of acidization. It was agreed to file an exception on Form PD 214-A and ask that the southeast corner of the 40 be adopted as the pattern, but that the operators be allowed to drill on each 10-acre tract within the 40, going counterclockwise to the northeast, northwest, and then southwest corners. They asked for an exception on condition that only second-hand equipment and materials be used for the initial well and that same then be salvaged for the remaining three wells on the quarter. Kevin-Sunburst is recognized as a so-called "poor man's" field with unusual conditions and OPC was asked to take that fact into consideration. Wells which have only a small show upon completion often are converted into commercial wells by acidization, but the drainage area for such wells is very limited.

Exploration of a vast



and vital Industry

This Fascinating Oil Business

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THE OIL AND GAS JOURNAL

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Personal Paragraphs

JAMES ANDERSON, vice president, director, and treasurer of Humble Oil & Refining Co., Houston, Tex., has announced his retirement from active service with his company the latter part of April. Mr. Anderson became associated with the Humble Pipe Line Co. in 1919, at which time he took charge of the construction and operation of its pipe-line system, and in 1920 was elected to its presidency. The following year he resigned from the Humble Pipe Line Co., and in February 1921, he was elected vice president and director of the Humble Oil & Refining Co. He was made treasurer of the company in the summer of 1941. A group of Mr. Anderson's friends honored him with a dinner Thursday night at the Ramada Club and presented him a gold watch.

E. J. SADLER, vice president of the Standard Oil Co. of New Jersey, was a business visitor of the Humble Oil & Refining Co. offices at Houston, Tex., the past week.

All officers and directors of Texas Pacific Coal & Oil Co., headed by J. ROBY PENN, president, and W. K. GORDON, chairman, both of Fort Worth, Tex., were reelected at the annual meeting of stockholders and directors last week. Other officers included C. E. YAGER, vice president; R. SEIBEL, vice president, secretary and treasurer; O. E. MITCHELL, vice president in charge of sales; R. J. FLECKENSTEIN, production manager, and W. K. HALL, general attorney.

E. K. SCHLUNTZ, formerly with Shell Oil Co., Inc., at Kirt, Okla., has been transferred to Wolco, Osage County, Oklahoma.

THOMAS H. WORK, president of the Nordon Corp., was reelected at the annual meeting of the board of directors, all of whom were also reelected.

J. L. HOBBS, who has been employed by the Gulf Oil Corp. at Crane, Tex., for many years, has recently moved with his family to Lubbock, Tex.

JIM MORRIS, Mid-Continent Petroleum Corp., Tulsa, left last week for Baxter Field, Montgomery, Ala., to take over new duties as flying instructor. He is being replaced by RALPH WILLIAMS.

A. R. BAILEY, R. G. FOLLIS and J. H. MacGAREGILL were recently elected members of the board of directors of Coast Counties Gas Co., succeeding R. K. DAVIES, P. H. PATCHIN and A. S. RUSSELL. All are present or former members of the official family of Standard Oil Co. of California.

WILLIAM F. LOWE, secretary, Natural Gasoline Association of America, was elected chairman of the southwestern section of the Society of Automotive Engineers at the last meeting of the season held at Tulsa last week. He succeeds G. C. RICHARDSON, Cities Service Oil Co., Bartlesville, Okla. ARCH L. FOSTER, Phillips Petroleum Co., Bartlesville, was elected secretary-treasurer.

DR. L. L. NETTLETON, of the Gulf Research & Development Co., Pittsburgh, Pa., addressed members of the Fort Worth, Tex., Geological Society Friday on "Salt Domes."

ROLAND F. HODDER, the Brown Geophysical Co., Houston, Tex., addressed the Derrick Club of Houston on "Geophysical Trends in the Gulf Coast Area," the past week. JAMES LEE KERR, Brown Geophysical Co., was elected president of the club and DICK ROSENCRANZ, Shell Oil Co., Inc., was elected vice president.

J. H. MARKLEY has been named division geologist, West Texas-New Mexico division of Texas Co., succeeding RALPH S. POWELL, transferred to Tulsa. Mr. Markley joined the Texas Co. in 1926, following two summers of work with the Illinois Geological Survey.

Do You Remember?

From The Oil and Gas Journal Files

25 YEARS AGO

Dr. A. Burton, inventor of the Burton cracking process, says that the gasoline supply will be exhausted in a year.

Those recent boosts in the price of oil would greatly increase field operations if oil-well supplies were more easily and more cheaply obtained.

One of the developments of the war, so far as the petroleum industry in Europe is concerned, has been the consolidation of most of the Russian companies into three big groups.

20 YEARS AGO

The first annual meeting of the Association of Natural Gasoline Manufacturers opened at Tulsa. A. V. Bourque is secretary of the association, and W. M. Welch is president.

One of the most promising side lines of the oil business, especially right now, is that of road oils, G. R. Slocum, sales manager of Midland Refining Co., opines. Last year a train load of road oil was shipped from the Mid-Continent to Illinois alone.

The Standard Oil Co. of New Jersey refinery at Bayonne, N. J., has been extended to a point where it can turn out almost 200,000 bbl. of refined oil products per day.

10 YEARS AGO

The intensified cooperative advertising and sales drive on Ethyl gasoline scheduled for next week will witness the heaviest expenditure in advertising on record for publicizing any product during a similar length of time.

The department organization of the National Independent Oil Association was completed this week at a meeting held in St. Louis. W. R. McCain, Purity Oil Co., was elected president.

J. J. Conry, superintendent of production, and George H. Lang, assistant to the president, have been made directors of Carter Oil Co.

ELDON L. STOVALL, engineer in civilian life for Magnolia Petroleum Co., at St. Louis, Okla., has been promoted from first lieutenant to captain in the Army.

JOHN R. BLACK, formerly of Oklahoma, has purchased a large home, part of the Mike H. Thomas estate, in Dallas, Tex., and plans to move into it as soon as it has been remodeled.

C. W. (MIKE) MICHAELS, who has been scout at Stillwater, Okla., for Shell Oil Co., Inc., is being transferred to Wichita, Kans., to succeed CLYDE W. BEEBE, who has joined the Army.

D. H. WARTMAN, General Petroleum Corp., has been advanced from southern California resident manager to retail-sales manager, supervising all retail-sales activities in the entire marketing area.

RUSSELL B. BROWN, chief counsel for the I.P.A.A., made two addresses this week before district units of the association. He was at El Dorado, Ark., on Tuesday, and will speak at the Fort Worth, Tex., meeting on Friday.

DELBERT D. LEWIS, Los Angeles, Calif., has been appointed field superintendent for Drillers & Producers, Ltd., and associate interests operating in the Turner Valley field, in Canada. He and his family have taken up residence at Black Diamond, Alta.

LAWRENCE VANDER LECK, president of Oil Producers Agency of California for the fiscal year 1941-42, has been reelected for the term ending April 1943, and RUSH M. BLODGET, executive vice president, was also reelected.

JOHN A. BROWN, president, Socony-Vacuum Oil Co., Inc., reports that 900 employes of the company have entered military service.

CARL F. SCHUPP, II, former employe of Humble Oil & Refining Co. at Houston, Tex., has been promoted to rank of captain in the United States cavalry.

SAMUEL L. H. BURK, chief job analyst for Atlantic Refining Co., addressed the Baltimore chapter of the National Association of Cost Accountants, at Baltimore, Md., this week.

CARL A. RIDDLE, maintenance superintendent, and ROBERT R. BERNHARD, a helper, were injured in a fire at the bulk storage plant of Shell Oil Co., Inc., at New Orleans, La., last week.

J. C. RECTOR, Union Oil Co., Bakersfield, Calif., addressed the San Joaquin Valley chapter of the A.P.I., at Bakersfield, this week, on "Duties and Responsibilities of California State Guard in the Oil Fields."

PETE BOUCHILON, foreman for the Sunray refinery at Allen, Okla., visited in Tulsa last Friday, while en route to the Atlantic Coast, there to embark for England, where he will superintend the laying of a pipe line.

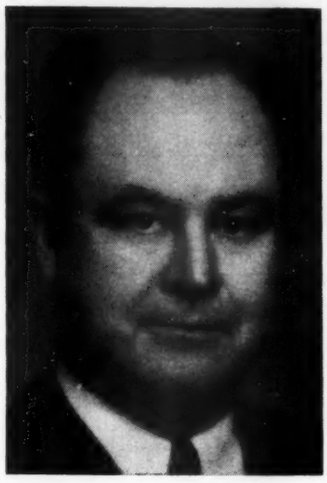
DR. A. W. GAUGER, director of mineral industries research at Pennsylvania State College, is now on a 5-week trip through the oil fields of the Mid-Continent and California. He will visit private and university laboratories.

LLOYD EXLEY, Oil City, Pa., was injured in a blast at Brundred Oil Corp.'s lease near Petroleum Center, Pa., last week. He is suffering from broken ribs and a head laceration. The accident occurred while dynamiting oil stumps preparatory to drilling a well.

DR. FRANK H. DOTTERWEICH, professor of natural-gas engineering at Texas A. & I. College, Kingsville, Tex., was in Washington, D. C., last week conferring with PAUL RAIGORODSKY, director of natural-gas production for OPC. The discussion had to do with methods whereby natural gas may be used as a raw material for the production of consumer goods.

Oil Man—Politico

One of the dominant figures among Texas independent operators is E. B. Germany of Dallas whose varied interests have put him to the fore in both the industry and in state and national politics. At present Mr. Germany is vigorously sponsoring a movement among the independents to assist in finding ways and means to increase the movement of oil from Texas fields to eastern markets. He has also offered his services to the U. S. Army as backer of an idea—an idea that the Army is going to need staff officers who have the "know-how" about oil and who can direct whatever drilling, demolition or concealment of oil properties the Army may undertake.



E. B. GERMANY

In addition to these activities, he is a major in the Headquarters Staff Intelligence and Communication Air Branch of the Texas Defense Guard (he completed a 3-months ground course in 3 weeks), flies his own airplane, is prime mover behind the Lone Star Iron & Steel Co. which has been chartered and approved by the Defense Plant Corp. for the development of East Texas iron deposits, and finds time to go fishing regularly with his wife at a summer camp on his farm in Van Zandt County. He and Mrs. Germany built the camp house out of an old street car.

Mr. Germany was born in Nolan County, Texas, in September 1892. He attended public schools in Grand Saline, Tex., where his family moved a few years later, went to Southwestern University at Georgetown and returned to Grand Saline to teach school. He entered the oil business at Mexia, Tex., as geologist and land man and by 1928 was in business for himself, an associate of the well-known firm of Cranfill & Germany. Since the death of his associate, Mr. Germany has operated as E. B. Germany & Sons (Wilson and Norman). He also has a daughter, Mrs. Annette Germany Wilkes.

He has been active in all branches of the oil-producing industry and was connected with the Independent Pipe Line Co. and many other firms which have helped develop the Texas industry. He is now serving his second term as chairman of the state Democratic executive committee and has just finished serving his fourth term as mayor of Highland Park on the outskirts of Dallas.

E. G. ALDRIDGE, oil operator, was recently elected mayor of Wewoka, Okla., by a 22-vote margin over his opponent.

T. J. DWYER, Gulf Oil Corp., Odessa, Tex., has been appointed chairman of the Ector County, Texas, draft board.

G. A. POOLE, oil man of Odessa, Tex., has been reelected president of the board for the Ector County, Texas, Independent School district.

R. D. MORIARTY, foreign material division, Standard Oil Co. of New Jersey, who has been vacationing in Tulsa, left Tuesday for New York City.

H. W. FLOYD has been promoted to general manager of Buckeye Pipe Line Co. He was formerly assistant general manager, and in his present position he succeeds G. E. PIFER.

JAMES S. NOLAND, proration expert for Barnsdall Oil Co., Tulsa, was acclaimed "champion liar" of the Tulsa Lion's Club last week, and was presented with a silver loving cup.

ED RUMSEY, land man and geologist for Shell Oil Co., Inc., at Amarillo, Tex., has been incapacitated for a week with an infected foot. He was somewhat improved at last report.

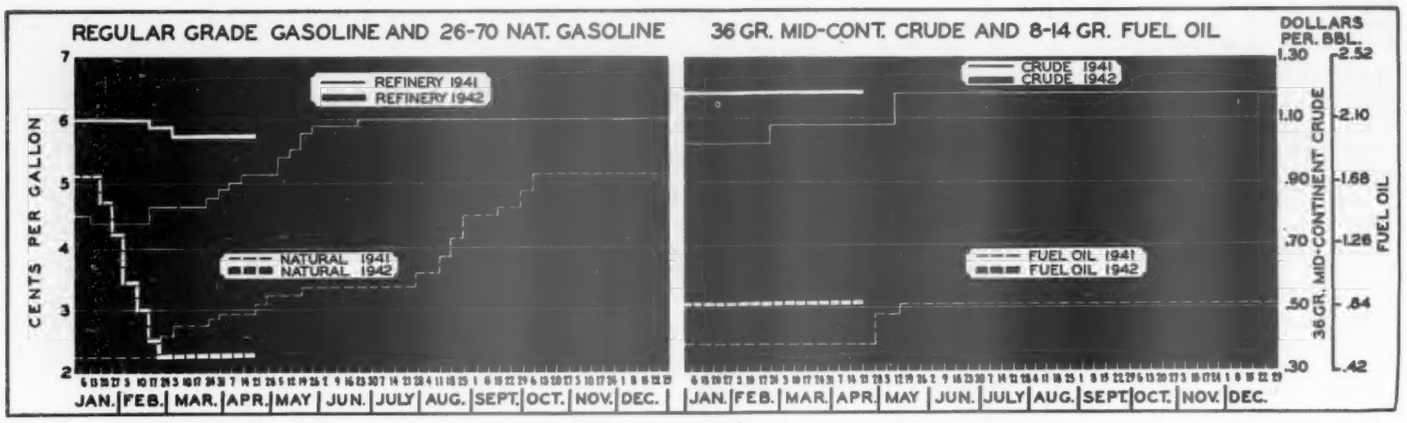
PUTT JANEWAY, Deep Rock Oil Corp., Tulsa, is chairman of the Petroleum Charity Ball Association, which will hold its fifth annual ball at Tulsa, May 6. Working committees have been appointed and plans laid for a ticket-selling drive.

B. P. SIBOLE, president, Stanolind Pipe Line Co., Tulsa, will be chairman for the dinner to be held at the First Christian Church April 27, in connection with the Oklahoma and Tulsa Council of Churches 3-day spring religious festival.

P. R. APPLEGATE has been reelected president of Northern Pipe Line Co., along with the other officers of the company, including J. A. BARTLETT, vice president and general manager; J. H. PEPER, vice president and chief engineer; G. S. PATTERSON, vice president; J. R. FAST, secretary, and C. H. CLEAVER, treasurer.

Shifts: WILLIAM OSMOND, engineer, Shell Oil Co., Inc., Jacksboro, Tex., to Wewoka, Okla.; H. C. GRIFFIN, superintendent, Mid-Union Drilling Co., Gainesville to Wichita Falls, Tex.; A. W. SPECKLES, engineer, Texas Co., Greenville to Cameron, Tex.; W. O. TIDWELL, engineer, Loffland Brothers Drilling Co., Fort Stockton, Tex., to Oklahoma City, Okla.; S. T. DUREE, superintendent, Cities Service Oil Co., Daisetta to Victoria, Tex.; E. L. FIPPS, geologist, Plymouth Oil Co., Fort Scott, Kans., to Mount Vernon, Ill.; J. W. WILLIAMS, superintendent, Falcon-Seaboard Drilling Co., Houma, La., to Corpus Christi, Tex.; H. D. JONES, superintendent, Barnsdall Oil Co., Houma, La., to Hope, Ark.; A. W. REA, superintendent, J. V. Dunbar Drilling Co., Sims to Newton, Ill.; DON R. JOHNSON, engineer, Gulf Oil Corp., Tulsa, to Galveston, Tex.; CARL R. TEMPLE, engineer, Texas Co., Seminole, Okla., to Wichita, Kans.; J. F. SCOTT, engineer, Carter Oil Co., Shreveport, La., to Magnolia, Ark.; J. RAY STEBBINS, Stebbins Oil & Gas Co., Mount Vernon, Ill., to Evansville, Ind.; F. G. RAPPOPORT, ESQ., British Controlled Oilfields, Ltd., Maracaibo, Venezuela, to Guayaquil, Ecuador; T. S. GERALD, Madill, Okla., to Mount Vernon, Ill.

War has reduced the East Texas district staff of petroleum engineers on the Texas Railroad Commission from six to three and has caused a number of changes in assignments. Latest transfer sent MAURITZ SWENSON from Jefferson, in the East Texas district, to Wichita Falls. Present East Texas staff consists of JAMES A. BUTTS, deputy supervisor of the district engineering department; A. S. TRUBE and ROY COCHRAN. East Texas engineers transferred or inducted into the Army since 1940 include W. A. MIDDLETON, A. H. BARBECK, CHARLES LITTLE, and BOB THOMPSON.



MARKET DEVELOPMENTS . . .

Mid-Continent

TONE of the Mid-Continent motor-fuel market continued its trend to firmer ground this week, although quotations are unchanged at a range of 5.5 to 5.625 cents per gallon for regular gasoline.

Eastern buyers are reported to be actively canvassing the interior market for contractural relationships covering extended periods, ranging up to 12 months. Purchasers are said to be willing to accept large quantities of motor fuel, kerosene and all grades of burning oil. There is no resistance displayed by potential purchasers to the current range of quotations despite the volume of material they are willing to accept.

Mid-Continent refiners received substantial calls this week from regular customers in the northern part of the Middle West for gasoline to cover requirements of farmers. Evidence is growing that agricultural consumption of petroleum products will reach an all-time peak this summer and next fall.

Rumors reached the Mid-Continent this week that the Office of Petroleum Coordinator is considering a recommendation, possibly one that will be supported by a War Production Board limitation order, barring contract fuel-oil commitments over the next winter season. OPC is reported to be opposing contract commitments, fearing that wholesale abrogations may become necessary in order to meet essential requirements for fuel oil in war industries.

Another reduction in the quality of regular gasoline may be forthcoming. Federal agencies are reported to be reexamining the position of tetraethyl lead stocks. Monday's order banning use of benzene in regular motor fuel is possibly a move that will lower octane standards in certain sections of the country. The benzene limitation order is primarily intended to increase the available supplies of styrene but it is used as a knock-depressant aid by many refiners.

Calls continued brisk for practically all grades of fuel oil, although distributors supplying home consumers have modified their shipping instructions.

Natural gasoline is unchanged in the Group 3 market. Mid-Continent and northern refiners are absorbing practically all current production north of Texas. North Texas manufacturers are still seeking additional outlets to offset the sharp reduction in shipments to the Gulf Coast.

East Coast

NEW YORK.—Arrangements have been completed for reimbursement of Atlantic seaboard oil suppliers of extra transportation costs involved in the movement of petroleum products into the East Coast area.

SENTENCE SUMMARIES

MID-CONTINENT: Refiners receiving inquiries from eastern buyers for long-term supply contracts.

EAST COAST: Higher tanker surcharges again pose question of price adjustments.

GULF COAST: Distress gasoline appears in small quantities. Fuels and other products unchanged.

PACIFIC COAST: Trading limited to small quantities. Prices holding but market tone is soft.

PENNSYLVANIA: Interrefinery sales continue at brisk rate. Prices firm for lubricants, kerosene and fuel oils.

Companies utilizing the more expensive means of transportation, whether tank cars, barges, or other methods costing more than would be chargeable to normal methods of delivery, will submit an accounting each month of extra expense to a special industry committee, under a plan recommended by Oil Coordinator Ickes on April 9. They will also report additional funds received as a result of special price increases granted by the Office of Price Administration to cover the higher costs, and such funds of all participating companies will be pooled and divided later on a pro rata basis with relation to individual company costs. The plan expires December 31, 1942.

Extra costs involved in the recent sharp rise in tanker surcharges will not be included in this arrangement, but will be taken care of separately. The extra surcharges involve a rise in transportation costs ranging from 1.5 cents a gallon on gasoline to 1.8 cents a gallon on bunker fuel oil, it is estimated.

The East Coast oil trade is convinced that tank cars alone cannot move enough oil to supply all essential needs for this area in view of prospects of an indefinite tanker scarcity, and has come to the conclusion that additional pipe lines are the only solution to the problem. Large and small oil suppliers are reported to be anxious to participate in any new pipe-line project which can be launched.

A.P.I. REFINERY REPORT

For Week Ended April 11

(Figures in thousands of barrels)

	Dly. crude runs to stills	Stocks: Gasoline	Residual	Gas oil
East Coast	403	17,035	5,896	6,261
Appalachian	149	4,029	643	361
Ind., Ill., Ky.	670	23,120	3,569	2,596
Okla., Kans., Mo.	345	10,148	1,764	811
Inland Texas	174	3,818	1,042	105
Texas Gulf	881	20,953	7,906	7,154
Louisiana Gulf	143	4,360	1,483	1,312
N. La. and Arkansas	77	1,249	212	115
Rockies	94	2,526	596	264
California	582	17,342	59,415	11,623
Total Apr. 11, 1942	3,518	104,580	82,526	30,602
Total Apr. 4, 1942	3,515	105,149	82,455	31,231
Total Apr. 12, 1941	3,664	98,110	93,616	29,378

Note: Refinery runs and stocks for week ended April 18, 1942, appear on Trends page.

CRUDE-OIL STOCKS

(Bureau of Mines Estimate)

Week ended:	Bbl. of crude*
April 11, 1942	258,442,000
April 4, 1942	261,768,000
April 12, 1941	265,160,000

*Excludes heavy, unrefinable crude in California.

Gulf Coast

HOUSTON, Tex.—There were no important changes in the Gulf Coast refinery markets this week. Movement of material continued to be retarded by limited transportation facilities although shipments are said to have been maintained with previous recent levels. There was no change in quotations although price concessions on some distress gasoline were reported. Prices on other major refined products were reported firm and some observers anticipate higher ceilings on some material as the result of recent advances in tanker rates and the increased cost of tank-car movement.

Buying on the open market was still limited to small sales and activity was governed largely by the ability to obtain tank cars. Fuel oils were in good demand but stocks were limited and buyers were finding it difficult to obtain material. Kerosene 41-43 water white was quoted at 3.75 cents per gallon and although there was good demand, movement was confined to small volume.

Pacific Coast

LOS ANGELES, Calif.—California petroleum markets were relatively quiet this week. There is some hope that the new conservation program now in effect will have a tendency to remove excess crude from the spot market which might bolster refined-oil prices.

Fuel oil continues firm at the pegged prices, natural gasoline is fairly strong, but motor gasoline soft and only moving in small quantities.

High railroad and truck costs along California's coastline into Washington and Oregon are raising costs of Pacific Coast marketers. With prices pegged, this added transportation cost represents a financial loss on every gallon of refined oil moved by rail or truck.

REFINERY AND TANK-WAGON PRICES

(Prices as of April 21)

Refinery Gasoline

Octane (A.S.T.M.):	†80	78	74-76	72-74	68-70	63-66	60 & lower
Mid-Continent*	.....	.....	.....	5.500-5.625	.....	5.125-5.250	4.750-4.875
Pennsylvania	.....	.....	6.750-7.000	.....	.....	.....	.....
Gulf Coast‡	6.00-6.50	.....	.....	§5.750-6.250	§5.750-6.250	§5.250-5.750	§5.000-5.500
Northeast Coast	9.30	.....	.....	8.800	8.800	.....	.....
Pacific Coast	.....	6.500-6.750	6.125-6.250	6.250-6.500	5.750-6.250	5.000-5.250	4.500-4.750

*Basis Group 3. †1939 C.F.R. (research method). ‡Integrated companies restricted to lowest prices. §Unleaded.

Quotations are f.o.b. plant in cars and in cents per gallon except where otherwise noted. They are exclusive of the federal excise taxes of 1.5 cents a gallon on gasoline and 4.5 cents a gallon on lubricating oils, and do not include marine lighterage charges.

Natural Gasoline

Grades:	26-70	18-55	75-85(350-375)
Oklahoma (Group 3)	2.250	2.625-2.750	.....
North Texas	2.000	2.375-2.500	.....
North Louisiana	2.125	2.500-2.625	.....
California	.....	.....	5.000-5.500

Kerosene and No. 1 Fuel Oil

Gravity:	46	45	42-44	41-43	38-40
Mid-Continent*	.....	.....	4.500-4.750	4.375-4.625	.....
North Louisiana	.....	.....	.....	4.500-4.750	.....
Pennsylvania	6.250	6.125-6.250	.....	.....	.....
California	.....	.....	.....	4.500-6.000	4.500
Northeast Coast	.....	.....	.....	5.700	.....
Gulf Coast	.....	.....	.....	3.875	.....

*Basis Oklahoma Group 3.

Tractor, Diesel, and Bunker Fuel Oil

Specifications:	46-48° G.	24 D.I.	48-52 D.I.	58 & above	Diesel bunkers	Bunker C
Mid-Continent*	4.125	.....	.....	.....	.....	.....
California	.....	2.750-4.000	.....	.....	‡$1.35-1.45	$0.80-0.90
Gulf Coast	.....	.....	4.000	4.125	1.45	0.85
Northeast Coast	.....	.....	.....	5.600	2.318	1.55
North Louisiana	.....	.....	.....	.....	.....	†0.80-0.85

*Basis Oklahoma Group 3. †10-14° gravity. ‡Pacific Specification 200.

Furnace Oil, Gas Oil, Fuel Oil

	No. 2	No. 3	No. 5	No. 6
Mid-Continent*	3.500-3.625	3.375-3.500	$0.85	$0.85
Pennsylvania (West)	5.625-5.875	5.375-5.875	†5.250-5.500	.....
Northeast Coast	5.6	5.6	1.85	1.55
Pacific Coast	5.5	5.5	‡0.75-95	$0.80
Gulf Coast	3.875-4.0	.....	1.65	0.85

*Basis Oklahoma Group 3. †36-40 gravity fuel oil. ‡Pacific Specification 300. §Pacific Specification 400.

Lubricating Oils

Bright and Steam Refined

OKLAHOMA (Group 3)—		
200-210 D, 10-25		27.00
150-160 D, 0-10		23.00
120-125 D, 0-10		22.00
Steam refined:		
600 dark green (untreated)	9.00	9.50
PENNSYLVANIA—		
Bright Stocks (Pennsylvania Grade No. 8 color, 140-150 at 210, 545-550 flash):		
10 pour point		30.50
15 pour point		29.50
25 pour point	25.00	28.00
Steam refined:		
600	15.00	16.00
650	15.50	16.50
600 flash	16.00	17.50
630 flash	17.00	17.50

Neutral Oil

(Vis. at 100° F. except Pennsylvania and color N.G.A.)

OKLAHOMA (Group 3)—	
0-10 pour point:	
200-3	15.00
300-3	18.00
500-3	19.50
600-3	20.00
Note: Viscous neutrals, 10-25 pour, quoted 0.5 cent under 0-10 oils.	

Neutral Oil

CALIFORNIA—		
Pale oils:		
200-2½-3	7.00	7.75
400-3-4	7.25	8.00
600-3-4	8.75	11.00
Red oils:		
200-4-5	7.00	7.75
400-5-6	9.00	11.00
500-900, 5-6½	9.25	11.25
GULF COAST—		
Pale oils:		
200-3	8.50	8.75
300-3	9.00	9.25
500-3½	9.75	10.00
750-3½	10.00	10.25
2,000-4	10.50	10.75
3,000-4	12.25	12.50
PENNSYLVANIA—		
150 vis. at 70° F., 3 color, 400-405 flash:		
Zero pour point		38.50
10 pour point		37.50
15 pour point		36.50
25 pour point		31.00
200 vis., at 70° F., 3 color:		
Zero pour point		40.50
10 pour point		39.50
15 pour point		38.50
25 pour point		33.00

Wax

(Cents per pound)

OKLAHOMA (Group 3)—	
124-126 (A.m.p.) w.c. scale	4.350-4.550
PENNSYLVANIA (inland refineries)—	
122-124 (A.m.p.) w.c. scale	4.250
124-126 (A.m.p.) w.c. scale	4.250

Wax

NEW YORK—	
Wax in bags fully refined:	
130-132 (A.m.p.) wax	6.250
133-135 (A.m.p.) wax	6.550
Crude scale:	
124-126 (A.m.p) w.s.	4.350-4.455
124-126 (A.m.p.) y.s.	4.350-4.455

EXPORT PRICES

Gasoline—60-62° Gravity, Maximum 400 End Point

Octane:	72-74	68-70	65-66	60
Gulf Coast	6.500	6.250-6.500	5.875	5.625
Pacific Coast	.....	6.125-6.500	5.875-6.000	5.500-5.625

Distillate and Fuel Oil

	Kerosene	Diesel fuel				Bunker
	41-43	24 G.	48-52 D.I.	58 D.I.	Bunkers	C grade
Gulf Coast	4.000-4.250	.....	4.125-4.375	4.375	$1.65-80	$0.85-95
Pacific Coast	4.750-5.000	1.25-30	.....	.....	†1.35-45	*0.80-90

*Pacific Specification 400. †Pacific Specification 200.

Lubricating Oils

	Neutral oils		Bright and cylinder stocks		
	200-3	150-3	200-3	150-3	600&630 S.R.
Mid-Continent	16.8	.....	28.8	24.8	.....
Pennsylvania	43-50	41-46	36-37	36-37	26.5-27

GASOLINE AND KEROSENE TANK-WAGON PRICES IN 50 CITIES

(Gasoline prices based on regular grades, tax included, undivided dealer)

ATLANTIC AND NEW ENGLAND

(Socony-Vacuum Oil Co., Inc., and Atlantic Refining Co.)

	Dealer tank wagon	Combined tax	Kero tank wag.
Baltimore, Md.	15.05	5.50	9.10
Boston, Mass.	14.50	4.50	8.40
Burlington, Vt.	16.50	5.50	...
Buffalo, N. Y.	15.80	5.50	9.20
Dover, Del.	16.30	5.50	10.80
Hartford, Conn.	15.20	4.50	...
Manchester, N. H.	16.90	5.50	9.40
Newark, N. J.	14.30	4.50	8.30
New York, N. Y.	15.70	5.50	8.40
Philadelphia, Pa.	15.80	5.50	10.55
Pittsburgh, Pa.	16.30	5.50	10.90
Portland, Me.	15.90	5.50	8.50
Providence, R. I.	14.60	4.50	8.20
Washington, D. C.	14.30	3.50	9.60
Average 14 cities	15.51	5.07	9.28

(All prices undivided dealer basis.)

CENTRAL

(Standard Oil Co. of Indiana, Standard Oil Co. of Ohio, Continental Oil Co. and Texas Co.)

	Dealer tank wagon	Combined tax	Kero tank wag.
Chicago, Ill.	14.10	4.50	10.30
Cleveland, Ohio	15.00	5.50	*9.00
Dallas, Tex.	13.00	5.50	7.00
Des Moines, Iowa	11.90	4.50	9.80
Detroit, Mich.	14.40	4.50	9.60
Fargo, N. D.	16.90	5.50	11.30
Huron, S. D.	16.30	5.50	10.70
Indianapolis, Ind.	15.20	5.50	9.80
Little Rock, Ark.	17.50	8.00	10.00
Milwaukee, Wis.	16.10	5.50	10.50
Minneapolis, Minn.	15.40	5.50	10.30
Omaha, Neb.	15.40	6.50	9.80
Tulsa, Okla.	16.50	7.00	8.50
Wichita, Kans.	12.70	4.50	8.00
Average 14 cities	15.03	5.57	9.61

*Includes 1-cent state tax.

SOUTHEASTERN

(Standard Oil Companies of New Jersey, Kentucky and Louisiana)

	Dealer tank wagon	Combined tax	Kero tank wag.
Atlanta, Ga.	19.00	7.50	9.40
Birmingham, Ala.	19.60	8.50	9.00
Charleston, S. C.	18.55	7.50	...
Charleston, W. Va.	18.85	6.50	11.90
Charlotte, N. C.	19.70	7.50	9.90
Jacksonville, Fla.	19.00	8.50	8.40
Jackson, Miss.	18.00	7.50	8.50
Louisville, Ky.	17.00	6.50	8.50
Memphis, Tenn.	17.75	8.50	10.50
New Orleans, La.	17.25	8.50	*10.00
Norfolk, Va.	17.05	6.50	10.60
Average 11 cities	18.34	7.59	9.67

*Includes 1-cent state tax.

MIDWESTERN

(Continental Oil Co.)

	Dealer tank wagon	Combined tax	Kero tank wag.
Albuquerque, N. M.	17.50	7.50	10.00
Boise, Idaho	20.10	6.50	16.50
Casper, Wyo.	17.00	5.50	12.00
Denver, Colo.	14.50	5.50	11.00
Helena, Mont.	17.00	6.50	13.00
Phoenix, Ariz.	18.50	6.50	12.50
Reno, Nev.	17.50	5.50	13.50
Salt Lake, Utah	18.50	6.50	14.50
Average 8 cities	17.58	6.25	12.88

PACIFIC COAST

(Standard Oil Co. of California)

	Dealer tank wagon	Combined tax	Kero tank wag.
Portland, Ore.	17.00	6.50	13.50
San Francisco, Calif.	14.50	4.50	11.50
Seattle, Wash.	17.00	6.50	13.50
Average 3 cities	16.17	5.83	12.83
Average 50 cities	16.37	5.96	10.30
Average last week	16.37	5.96	10.30

Canadian Tests

CHATHAM, Ont.—A new potential gas area will be tested by George Rawlings & Co. for the Dominion Natural Gas Co. in Orford Township, Kent County, where locations have been made on the J. A. Misner farm, Lot 13, Concession 11, and the W. T. Henderson farm, Lot 3, Concession 14. The area lies between the Chatham-Camden gas field and the Bothwell-Thamesville shallow-oil fields, north of the River Thames and the south part of Orford where gas shows, but no commercial production, have been occasionally encountered.

In the Antelope Hills area of eastern Alberta, close to the Saskatchewan boundary, Alliance Oils 1 has been located by Geologist Russell V. Johnson in LSD 15, 19-20-1w4. Rig will be moved to location, which is 18 miles south of Empress.

On the Pouce Coupe structure, in the northern foothills west of Peace River, Bonanza Royalties 1, LSD 16, 22-80-13w6, has equipment moving and is expected to spud this month. Rotary tools will be used and the objective will be the upper Triassic limestone around 4,725 ft., with possibilities of production in the overlying Jurassic and Cretaceous formations. A test by Northwest Co. in the same general area encountered 10,000,000 cu. ft. of gas in one of the overlying formations and Guardian 1 well got oil shows in the lime at 4,780 ft.

Crude-Oil Prices

Representative selected crude prices from all sections of the country appear below:

East Texas	$1.25
Conroe	1.43
Tepetate, Louisiana	1.18
Smackover, Arkansas, heavy	.83
Illinois basin	1.37
Pecos County, Texas	.95
Lance Creek, Wyoming	1.12
Bradford, Pennsylvania	3.00

Gravity Schedules

Top prices include all gravities above grades designated, and low prices include all gravities below grades designated:

Gravity	Signal Hill, Calif.	Oklahoma, Kansas	Gulf Coast, Texas	West Texas*
18-18.9	$0.80	...	...	...
19-19.9	.84	...	$1.06	$0.70
20-20.9	.88	$0.85	1.08	.72
21-21.9	.92	.87	1.10	.74
22-22.9	.96	.89	1.12	.76
23-23.9	1.00	.91	1.14	.78
24-24.9	1.03	.93	1.16	.80
25-25.9	1.07	.95	1.18	.82
26-26.9	1.11	.97	1.20	.84
27-27.9	1.15	.99	1.22	.86
28-28.9	1.18	1.01	1.24	.88
29-29.9	1.20	1.03	1.26	.90
30-30.9	1.23	1.05	1.28	.92
31-31.9	...	1.07	1.30	.94
32-32.9	...	1.09	1.32	.96
33-33.9	...	1.11	1.34	.98
34-34.9	...	1.13	1.36	1.00
35-35.9	...	1.15	1.38	1.02
36-36.9	...	1.17	1.40	1.04
37-37.9	...	1.19	1.42	1.06
38-38.9	...	1.21	1.44	1.08
39-39.9	...	1.23	1.46	1.10
40 and above	...	1.25	1.48	1.12

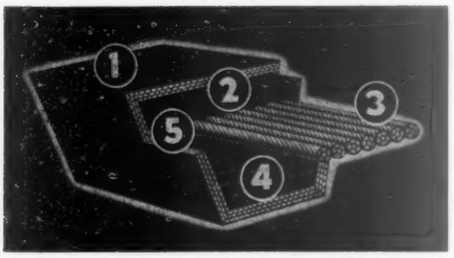
*Includes Lea County, New Mexico.

EQUIPMENT PROGRESS...

Tougher Resistance Is Built Into Goodyear Multi-V Belt

Following years of field testing, Goodyear Rubber Co., Akron, Ohio, recently changed its multiple V-belt line to take full advantage of the wide scope of research work and available data from the compounding department of the company's tire division.

Sheathed with a new, tougher, black cover that insures longer wear, more uniform pull and higher resistance to heat, oil and other enemies of long belt life, the new product takes advantage of the fact that the toughest, longest-wearing compounds have always been black because of the use of black carbon stocks, whose inherent qualities have made them most desirable to the compounder.



Construction of Goodyear E-C Cord multi-V belt, showing: (1) Heavy, supertough black cover with uniform friction, longer life; (2) tension section; (3) neutral plane with heavy endless load-carrying compass cords; (4) compression section, (5) insulating gum

More uniform pull and better balanced performance results from the fact that it is possible to build this new black cover with more consistent coefficient of friction, essential to a balanced drive.

In addition, the "compass" cord construction concentrates the load-carrying cords in the neutral axis where all pull evenly, without uneven stresses—thus enabling the belt to deliver higher efficiency on multi-V drives.

This new, E-C Cord Multi-V belt is made in all standard cross-sections and lengths and is sold in sets, precision-matched under operating tensions.

TRADE LITERATURE

OIL WELL SUPPLY CO., Dallas, Tex. — Bulletin U6-442, describing TC-23H and TC-33H twin-crank pumping units, and Bulletin U7-442, describing TC-12H and TC-17C twin-crank pumping units. These bulletins, available from any Oilwell store or the company's general offices, complete a set of descriptive literature covering the entire line of Oilwell pumping units.

MONSANTO CHEMICAL CO., St. Louis, Mo.—A 10-page, file-size booklet, "Santopour—a Pour-Point Depressant for Lubricating Oils." It describes the properties of Santopour, a pour-point depressant developed primarily for use in heavy wax-bearing paraffinic type lubricating oils, its method of application, effect on properties of oils, and test and service results. A number of curves showing its action in a variety of oil stocks is presented.

S. F. BOWSER & CO., Inc., Fort Wayne, Ind.—Circular titled "To Help You Win the War of Production," and booklet, "Flow-Indicating Devices," picturing and listing various types and applications of flow control and indicating devices.

JAMES P. MARSH CORP., 2073 Southport Ave., Chicago, Ill.—A poster dealing with the subject of "Conservation of Vital Materials." It is approximately 22 by 30 in. in size and printed in red, white and blue. It is available in reasonable quantities for the asking and in large quantities for the cost of printing. Company name space is left blank for the insertion of any company name desired.

E. D. BULLARD CO., 275 Eighth Street, San Francisco, Calif.—Folder entitled, "How to Encourage Eye Protection in Your Plant," describing how several plants have cut eye injuries by appealing to workers' self-interest in their safety programs, and by making eye protection pleasant for the workers to use. Goggles and eye shields for grinding, machine work, dusty atmosphere, welding and many other uses are illustrated.

LA PLANTE-CHOATE MANUFACTURING CO., Cedar Rapids, Iowa.—Eight-page two-color booklet, "In the Oil Industry," a pictorial review of the production of oil from drilling to the refinery. Trailbuilders, bulldozers and scrapers are pictured building roads to new fields, clearing drilling sites, digging and filling slush pits, and moving equipment. It may be obtained from any Caterpillar-LaPlant-Choate distributor, as well as from the manufacturer.

Synthetic Rubber Thread Is Developed by Goodrich

Once again extending the uses of synthetic rubber, the B. F. Goodrich Co. announces what it believes is the first synthetic rubber thread ever developed in this country, made from the Ameripol synthetic rubber created in its own laboratories. W. S. Richardson, general manager of the industrial products sales division, said:

"This synthetic rubber thread, made from our Ameripol synthetic rubber has been developed through one of the most intensive research programs ever devoted to a single product, starting about January 1.

"Primarily this development has been for military purposes, to conserve the natural rubber thread that formerly went into products used by our armed services. There is at present no possibility that any of the thread can be diverted to the manufacture of civilian products, but we hope that future circumstances will allow that course."

Some of the potential military uses for the synthetic rubber thread, the B. F. Goodrich Co. said, are in harness for parachutes, gas masks and respirators. Rigorous tests on the new synthetic rubber thread show 700 per cent elongation, comparable to the rubber thread previously made from natural rubber compounds. Its comeback, or "kick" is comparatively the same, while its physical properties, under accelerated aging are better stabilized.

Elastic Stop Nuts Offered For General Testing Needs

Elastic Stop gang channel nuts, widely applied in the aircraft industry, are now offered by the Elastic Stop Nut Corp., Union, N. J., for testing on the many applications in general industry where a multiple self-locking, bolted fastening is required.

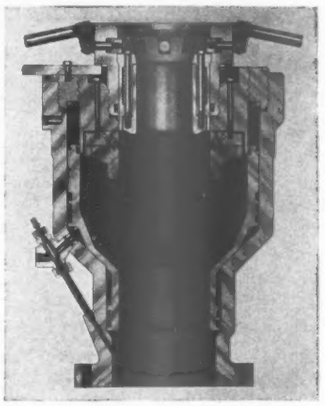
The strips of self-locking nuts are factory-assembled, and it is necessary only to rivet or otherwise fasten them to the structure where they are to be used. They consist of specially designed Elastic Stop nuts, with four lugs at the base and installed at specified intervals in a metal channel strip which is performed to accommodate the nut lugs under longitudinal flanges. The channel strip is pierced for the required nut size and spacing, and the nuts are held in place by dimples in the channel, tolerances permitting them to be vertically self-centering.

Auxiliary Unit to Protect Regular Preventer Packer

An auxiliary packing unit to protect the regular packer of the Hydril Type R blowout preventer from wear is announced by the Hydril Co., 714 West Olympic Boulevard, Los Angeles, Calif. Its main purpose is to provide a wear-absorbing member which will reduce packer-rubber replacement costs and conserve rubber.

The Type R blowout preventer ordinarily is supplied with a rubber packing unit of approximately the same bore as its connecting flange. Rubber packing units with a smaller bore heretofore have been substituted for the regular packing unit when pipe of small size was in use.

The new auxiliary packing unit allows changes in bore diameter between the maximum and minimum desired to be made by substituting auxiliary units of different size, the regular packing unit being used in all cases. It takes all of the wear during operation of the blowout preventer and can be replaced with relatively small expense.



Auxiliary packing unit showing locking device

The unit is attached to the Type R blowout preventer by a semiautomatic locking device shown in the accompanying cross-section view. The locking device permits the removal and assembly of the auxiliary packing unit in the blowout preventer with minimum effort.

When the drill string includes a member larger than the bore of the unit, the unit may be unlocked from its place in the blowout preventer by pulling a single lever located on the derrick floor. The auxiliary unit then is lifted out of the blowout preventer by a large diameter tool. When the string is started in the hole again the auxiliary unit drops into place in the blowout preventer and locks automatically.

When the Type R blowout preventer is being used in smaller sizes of casing, an auxiliary packing unit with a bore approximately the same as that of the casing is used. This increases the safety factor of the blowout preventer, as a much smaller area is spanned in closing the packer around the drill pipe.

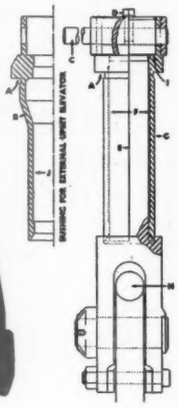
Allis-Chalmers Shows Movie On Activities in War Effort

"We Work for Victory and We Plan for Peace" is the name of a motion picture shown by Allis-Chalmers Manufacturing Co., Milwaukee, Wis., to a large number of purchasing agents, engineers and oil men in Tulsa, while they were guests of Oscar Haas, district manager, at a buffet supper April 16. The movie depicts the part the heavy-goods industries of this country are playing in the current war effort. Allis-Chalmers' contribution to every phase of the production program was vividly portrayed.

Duplex Body Made on Order To Go With BJ Triplex Hook

For special uses, BJ Triplex hooks, manufactured by Byron Jackson Co., Los Angeles, Calif., are now furnished on order with a "Duplex" body, which attaches in place of the usual Triplex, or three-hook body.

The left portion of the accompanying illustration shows the Duplex body used in connection with the new BJ swivel-ball-adapter to provide a quick, safe means of setting the kelly and swivel into the rathole when the drilling string is going in or coming out of the hole, or when casing is being run. In the line drawing, shown with the swivel ball *H* in position, the elevator is closed under a should *I* on a solid shank when small-diameter drill pipe is being used, or under the shoulder *A* of a bushing (split at *E*) when larger - diameter drill pipe is in service. By selecting the proper split bushing, each BJ swivel adapter will handle several drill-pipe sizes. For example, when the shank diameter *F* is 3½ in., the bushing *G* can be 4½ in. and the bushing at *J* will handle 4½-in. external upset drill pipe. One end of pin *C* holds the bushing retaining ring in position, while the outer end of this pin protrudes sufficiently to prevent rotation of the swivel in the elevator. A cap screw and lock washer *D* retain pin *C* in position. When the bushing for external-upset drill pipe is being used, the load is carried under the shoulder *A*. The diameter of the bushing at *B* (being less than the bore of the elevator) serves to center the bushing in the elevator, thus eliminating the possibility of a bending moment in the adapter.



The BJ swivel-ball-adapter is made in sizes for handling all popular sizes of drill pipe.

Steel Fence Alarm System Warns Plant of Intruders

An automatic electric alarm system designed for use in connection with steel wire fence in protection of refineries or other plants or properties against saboteurs or other intruders is being manufactured by Alarms, Inc., Youngstown, Ohio.

The system employs a new and improved method of protection, combining two tried and proved principles, the detection and amplification of sound. Each system includes two parts: the "detector" and the "indicator." The detector is an inertia type, vibration instrument to be mounted on the guard fence at predetermined intervals. These detectors are of rugged and moistureproof construction to withstand wear and weather. The indicator, to be located in office, guard headquarters or other designated point, is connected with the detector unit and is designed to supply both audible and visible warning of any attempt by prowlers to scale, cut through or tunnel under a fence. The indicator is built to operate on 110-120 volts, 60 cycle current (special voltages and frequencies if required) and conforms with government requirements of uninterrupted operation at temperatures varying from 40° below zero to 130° above.

When properly installed, the alarm cannot be turned off or disconnected by other than an authorized individual.

Many Improvements Are Made In Frederick Post Vapopaper

The Frederick Post Co., Chicago, Ill., recently has improved its ammonia dry-developed printing paper, Vapopaper. The new paper develops a deeper, sharper blue or red line print on a clean white background. Every roll in the same shipment or different shipments is entirely uniform both as to speed and color. Printing and developing machines do not have to be set to conform with the variance of speed in different rolls of paper.

The new Vapopaper not only is faster but also is tougher. Its 50 per cent rag content basic paper stock enables it to stand up under creasing and hard usage.

Transparent Glass-Coating To Give Bombing Protection

A transparent coating for application on glass to prevent shattering has been developed by Wilbur & Williams Co., Boston, Mass. It is provided in liquid form, ready for use, and is applied by spraying or brushing. It dries quickly, forming a tough film having a tensile strength of 3,000 to 5,000 lb. per sq. in. It passes sunlight with very little absorption. While not intended for long service on the exterior, where exposed to weather, it should give protection for an indefinite period on the interior. It is expected to be useful in protecting windows during air-raid bombings.

Western Machinery Extends Le Roi Service in Illinois

Western Machinery Co., Illinois Basin representative for Le Roi Co., Milwaukee, Wis., manufacturer of engines, has established a branch office at Centralia, Ill., with H. W. Magnus as manager and Bud Heidkamp in charge of the service department. The increased personnel, coupled with the new and improved facilities, will enable the company to provide faster and better service. A complete stock of Le Roi replacement parts will be carried.

Weed Killer Developed for Tank Farms and Refineries

Chipman Chemical Co., Inc., Bound Brook, N. J., Chicago, Ill., Houston, Tex., and Palo Alto, Calif., announces the development of a new weed killer, intended primarily for destroying weeds around oil tank farms and refineries. Designated as Atlas "A" Weed Killer, it is a highly concentrated sodium arsenite solution, containing 4 lb. of arsenic trioxide per gallon. It not only is noninflammable and nonexplosive but actually acts as a fire deterrent.

AMONG EQUIPMENT MEN...

Herrington Appointed Aide To Raise India War Supply

A. W. Herrington, president of Marion-Herrington Co., Indianapolis, Ind., has been appointed technical adviser and assistant to Col. Louis Johnson, head of the American diplomatic and economic mission to India, which is assigned the task of organizing the potential producing power of India to supply arms and munitions to China and other allied forces in the Orient. He was selected because of his leadership in design and production of all-wheel-drive military trucks, track-laying artillery tractors, combat tanks and other vehicles of war.

Mr. Herrington was an officer in the motor transport corps of the A.E.F. in France during the first World War, and since has developed many different military vehicles which have been adopted by the U. S. Army, Navy and Marine Corps. Before the start of the present war he obtained substantial orders for his company's products from this country's present allies, and inaugurated a construction and production program in his plant which placed his company far ahead of present demands for output. He supervised mechanization of the Persian army, and also designed the huge six-wheel-drive trucks for the construction of the Iraq pipe line, and a passenger-freight transport service across the Arabian desert. He is president of the Society of Automotive Engineers.

Reed Made Sales Manager For Sawhill Organization

William D. Reed, who for the past 3 years has been connected with the district sales office of Republic Steel Corp., at Chicago, Ill., and prior to that for several years with the pipe sales division of that company at Cleveland and Youngstown, O., has been made general manager of sales for the Sawhill Manufacturing Co., Wheatland, Pa., George A. Small, president, announces. He will supervise sale of tubular products of all kinds, including fabricated pipe, nipples, Monarch scaffolding and other items manufactured by this company.

BUSINESS NOTES

N. H. Anderson, representative for Guiberson Corp., Wichita Falls, Tex., has been transferred to Tulsa, where he will cover Oklahoma and Kansas, in addition to his former territory.

WAR CALL BRINGS CHANGES IN EMSCO OFFICIAL PERSONNEL . . .

Fred C. Ripley, Jr., manager of export sales, Emsco Derrick and Equipment Co., Los Angeles, Calif., for the past 5 years, has obtained a leave of absence for the duration of the war, Hugh Glen, president of the company, announces. Mr. Ripley, being an ardent yachting enthusiast, is expected to proffer his services to the naval branch of the Government.

E. B. "Ernie" Fowks, manager of patents, sales promotion and advertising, has been appointed acting manager of export sales in Mr. Ripley's absence. He will retain his present duties as manager of patents, but his sales promotion and advertising work will be assumed by R. O. Perry, who has been appointed manager of advertising and sales promotion for all divisions of the company, including the D & B division, with which he has been associated for the past 7 years.

All three men are well known to the industry. Mr. Ripley, who has made various trips to foreign countries for Emsco and its distributor, Continental Emsco Co., is a charter member of the Los Angeles chapter of Nomads. Mr. Fowks also has made numerous business trips to foreign countries and is a charter member of the Los Angeles Nomads. He has had many years of experience in various departments of the Emsco organization. Mr. Perry has been associated with the oil industry for many years.

E. B. Fowks, R. O. Perry, and Fred C. Ripley, Jr.

CLASSIFIED ADVERTISING

Patent Attorneys

PATENTS — TRADE MARKS

All cases submitted given personal attention.

Form "Evidence of Conception" with instructions for use and "Schedule of Government and Attorney's Fees"—FREE.

LANCASTER, ALLWINE & ROMMEL
Patent Law Offices
418 Bowen Bldg., Washington, D. C.

Leases and Drilling Blocks

LEASES—East Texas, La., Sou'h Ark. 20 acres up, dollar acre up.—Owners—Address Attorney, Box 1122, Little Rock, Ark.

LEASES ROYALTIES
PRODUCING OR NONPRODUCING
Texas, New Mexico, Oklahoma, Louisiana and Illinois
20 Years Experience
Inquiries Invited
B. D. BUCKLEY
Paul Brown Bldg., St. Louis, Mo.

FOR SALE: Oil and gas leases, small production, drilling propositions, fluorspar and rock asphalt deposits. Reports and maps furnished on request. W. P. Harley, Bowling Green, Ky.

EAST TEXAS 9,000 ft. Paluxy-Trinity sand wildcat. Quick bet for 10 to 50 for one. E. CROFT, PROCTOR, TEXAS.

CHEAP CRANE COUNTY Sec. 18, B28, under Magnolia-Stanolind leases. Jefferson G. Smith, 215 Littlefield Bldg., Austin, Tex.

BUY RANCH LAND under oil development. ⅛ royalty passes with title to land only $7 per acre. Box A-940 The Oil and Gas Journal, Tulsa, Okla.

FOR LEASE the NE¼ of the NE¼ of Sec. 3-34-3W, Toole County, Montana.
T. S. MILES
1004 First Natl. Bank Bldg., Omaha, Neb.

FOR LEASE, potential oil lands on Box Elder Structure near Havre, Mont. Now producing gas. See U. S. G. S. Bulletin 641CC. Address Box 505, Havre, Mont.

WILL ASSIGN 500 acres for well drilled. Acreage proven will produce Helium Gas at 1,000 feet; Oil at 3,100. Total market. Cowley County, Kansas. Write H. B. Snyder, Box 126, Ottawa, Kansas.

McLOUTH, KANS.—10,000 acres for farm out—80 acre leases cheap. Harry Haynes, Grantville, Kans.

Oil Industry Printing

OIL FIELD LEGAL BLANKS
Leases, assignments, releases, township plat books, well records, etc. Request on your letterhead gets free catalog. Olds Press, 215 East Third St., Tulsa, Okla.

Wanted

WANTED: Proven Oil production deals. $100,000 or more, no brokers.
M. R. TRAVIS
1702 S. Boulder. Ph. 2-2447, Tulsa, Okla.

WANTED: Capital to finance development of new process for manufacture of Toluol, Benzol and Butadiene, intermediates for production of T.N.T., 100 octane gasoline and synthetic rubber. Address: Thermo-Chemical, 1434 South Cincinnati, Tulsa, Okla.

Legal Blanks

BURKHART'S legal blanks and general forms serving Mid-Cont. oil field since 1908—Okla. Kans. N. Mex. Tex. Ala. Ark. Fla. Ga. Ill. Ind. Ky. La. Mich. Miss. Mo. Neb. N. Dak. Tenn. Wyo. Free catalog samples on request. Burkhart Ptg. & Sta. Co., 115 S. Cinn., Tulsa, Oklahoma.

If we do not maintain a classification exactly suited to the type of advertisement you wish to run we shall be glad to create a fitting one.

Classified Department

Royalties

ANDREW J. BARRETT
The Philtower
Tulsa, Oklahoma

WE BUY & SELL all types of Oil and Gas Royalties. Sales restricted to registered dealers only. Grimes Royalty Co., National Mutual Bldg., Tulsa, Okla.

DEEDED ROYALTIES
State Oil & Gas Leases
Harry S. Wright, Farmington, N. M.
REGISTERED ROYALTY DEALER

INQUIRIES invited to buy or sell producing royalties, Illinois preferable. J. A. Wolf, 407 S. Dearborn St., Chicago, Ill.

For Sale—Maps

EXECUTIVES MAP of the PERMIAN BASIN showing sections, oil wells, dry holes, drilling wells in blue, pool names depth, year discovered and no. wells, company lease blocks and date of expiration, Ordovician tests in red. Size 3 x 4 feet, Scale 4½ miles to inch. Price $5.00.
SOUTHWEST MAPPING CO.,
FT. WORTH, TEX.

Incorporation

DELAWARE CHARTERS: Complete service $35. Submitted forms. Chas. G. Guyer, Inc., Wilmington, Delaware.

Financing

CAPITAL SEEKERS — Interested in raising $25,000 or more for a legitimate project should communicate with AMSTER LEONARD, Fox Theater Bldg., Detroit, Mich.

OUT OF 5000 American financial houses only 223 bought small issues last few years. The 223 names $4.00. JOHN F. MORRIS. Box 5411, Philadelphia.

Help Wanted

CHEMIST: Thoroughly versed in theoretical and practical extraction of Naphthenic Acids. Capable in research work. Must have Vacuum plant experience. Salary commensurate with ability.

GRADUATE REFINERY ENGINEER: Capable superintend construction and operation specialty lubricating oil refinery. Full details and salary required. Box A-961, The Oil and Gas Journal, Tulsa, Okla.

REFINERY Maintenance Engineer, experienced in general refinery maintenance, design and construction. Must understand repair and cleaning of cracking units, internal combustion engines, and all types of pumping equipment. Box A-953, The Oil and Gas Journal, Tulsa, Okla.

HELP WANTED: Elderly man (not in draft) pumper small oil well near Okla. City. Small salary; good house. Box A-960, The Oil and gas Journal, Tulsa, Okla.

Help Wanted

DESIGNERS AND DRAFTSMEN

For Oil Refinery work carrying high priority ratings of A-1-A and A-1-B under

Government Defense Program

Working 56 hours 3 weeks per month and 44 hours one week with time and one-half for work in excess of 40 hours per week.

Must have experience in design of:

Oil Refinery Process Piping, Concrete and Structural, Oil Heating Furnaces, Pressure Vessels, Electrical Control and Light and Power Conduit Systems.

Can use several piping squad leaders. Must be thoroughly experienced on piping design and layout.

ARTHUR G. McKEE & COMPANY
Engineers & Contractors
OIL REFINERIES
BLAST FURNACES
STEEL PLANTS
2300 CHESTER AVENUE
CLEVELAND, OHIO

Equipment Wanted

WANTED
Large Steel Storage Tanks and Structural Steel Buildings.
GREENSPON'S
National Stock Yards
(St. Clair County), Ill.

WILL buy 10 or 15,000 feet of 5⅝" casing, 17 or 20 pound. Quote price McLouth, Kansas. Bank reference. Address: Box 2, McLouth, Kansas.

1—10' diameter tower either 25' or 30' long, ⅝" or ¾" thick. Steel must be in first-class condition. Fred Grey, PanAmerican Petroleum Corp., Destrehan, La.

WANTED: Good Used Power Rotary Rig Capable of Drilling to 7000 Ft. Only interested in Good Equipment. State location and price. Box 670, Fort Worth, Tex.

WANTED — Wichita or Jumbo Ft. Worth Spudder with tools and power or just machine. The larger the better. Walter A. Hale, Box 2437, Cut Bank, Mont.

Equipment Wanted

WANTED TO BUY
A 6¾" 16" or 18" power pump; also drilling mast, capacity 6000 to 7000 ft. of 4" Give full details and price. Dunlap & Graham, 2450 Cerritos, Long Beach, Calif.

WILL PAY CASH

Storage tanks, abandoned pipe lines or wells, gasoline plants, refineries or any material accumulating from the oil fields regardless of location.

WILL HANDLE UNLIMITED DEALS.

Plant and Equipment Purchasing Corp.
705 Provident Bank Bldg.
Cincinnati, Ohio

USED TANK CARS
Regardless of condition
Get up on present prices!
This may be the time to liquidate them!
Quotations cheerfully made without obligation
IRON & STEEL PRODUCTS, INC.
13412 S. Brainard Ave., Chicago, Ill.
"ANYTHING containing IRON or STEEL"

For Sale—Equipment

FOR SALE: 5½ Keystone Spudder with Hercules Engine and special Cotta Transmission and extra heavy mast. Tools from 10" down, Electric Plant and miscellaneous equipment. Veeder Supply & Development Company, P. O. Box 270, Cherryvale, Kansas.

EIGHTY extra heavy 3½" Key Headers, Jenkins Bubble Tower, Flash Tower, two Boilers and Settings, 2 Treating Towers, quantity of Valves and Fittings. Western Tank & Road Supply Co., Wichita, Kansas, or F. E. Reinhardt, General Delivery, Evansville, Ind.

FOR SALE: 12 K.W. Portable Light Plant powered by 35 H.P. International Engine. Melton Supply Co., Seminole, Okla.

1—Complete Big Diesel full electric, direct current rig.
1—Medium size Direct current full electric rig.
4—Rebuilt 120 HP Diesel engines.
1—Rebuilt 200 HP Diesel Engine.
1—Small steam rig.
1—Late Model "S" Cardwell Rig complete. Made 7 holes, same as new and equipped with 6,000 feet of 3½" full hole drill pipe which has made three holes.
3—300# W.P. Boilers, A-1 Condition.
1—200 HP Diesel engine with 125 KW Generator set and switchboard.
Several sizes of electric motors.
Also stock of new engines.
K. S. RICHARDS
840 West Vickery Phone 3-5600
Fort Worth, Texas.

FOR SALE: 1 Westinghouse 5½" x 6" Steam Engine direct connected to 10 KW-DC Generator $200.00. H. D. Patridge, Cities Service Oil Co., Bartlesville, Okla.

FOR SALE: 6 x 16 Wilson-Snyder Power Slush Pump. Melton Supply Co., Seminole, Okla.

FOR SALE: 9 miles of first class 3" line pipe with recessed couplings, perfect threads, and standard weight line pipe. 20 miles 2" line pipe, first class condition. The Interstate Pipe & Supply Company, P. O. Box 611, Marietta, Ohio.

5—80 HP Type 10 Bessemer Compressors complete. Also some spare parts for Clark & Bessemer Units. Bessemer, Clark, Cooper and I-R Compressor Cylinders complete.

NOLAN SALES CORPORATION
404 E. 2nd St. Tulsa, Okla.

FOR SALE at Bartlesville: 15 oak drafting tables, $35 each. Patridge, Cities Service Oil Co., Bartlesville, Okla.

FOR SALE: 125 H.P. 200 W.P. Broderick Boiler, Code Condition, $975. Melton Supply Co., Seminole, Okla.

FOR SALE
1—Ingersoll-Rand 6 and 12x12 Imperial Type 10 Compressor, $1,000.00.
1—80 h.p. Bessemer Gas Engine and 7 and 12x20 Compressor, $1,000.00.
2—90 h.p. Pattin Bros. Gas Engine and Direct-Driven Compressors 11½ and 6x14, $2,000.00 and $1,500.00.
1—60 h.p. Pattin Bros. Gas Engine and 5x14 Compressor, $1,000.00.
All now in operation near Cisco, Texas.
DEAN BROS.
W. T. Waggoner Building
Fort Worth, Texas.

CLASSIFIED ADVERTISING RATES

Classified advertising rates: First insertion, 35 cents a line; each additional insertion, 25 cents a line, PAYABLE IN ADVANCE. Six words usually make a line. Count as a word each one-letter word and each group of figures. White-space computed at regular line rate. Allow two extra lines for blind ads. Ads of less than three lines not accepted. No formal acknowledgment is made, and proofs cannot be shown in advance of publication.

	1 time	2 times	3 times	4 times		1 time	2 times	3 times	4 times
3 Lines	*$1.05*	*$1.80*	*$2.55*	*$3.30*	*7 Lines*	*$2.45*	*$4.20*	*$5.95*	*$7.70*
4 Lines	*1.40*	*2.40*	*3.40*	*4.40*	*8 Lines*	*2.80*	*4.80*	*6.80*	*8.80*
5 Lines	*1.75*	*3.00*	*4.25*	*5.50*	*9 Lines*	*3.15*	*5.40*	*7.65*	*9.90*
6 Lines	*2.10*	*3.60*	*5.10*	*6.60*	*10 Lines*	*3.50*	*6.00*	*8.50*	*11.00*

CLASSIFIED DISPLAY RATES

Classified Display is set with a border and may be used in one or two column sizes.

1 Inch	*1 time*	*$5.00*
1 Inch	*13 times*	*4.50 per inch*
1 Inch	*26 times*	*4.00 per inch*
1 Inch	*52 times*	*3.50 per inch*

This space may be contracted for over a period of one year from the date of the first insertion and is PAYABLE IN ADVANCE, MONTHLY.

We reserve the right to withhold all advertising of questionable character. To avoid delay be sure to send remittance with copy. We will set your ad in the smallest amount of space possible and refund all overpayments. One-time insertions will not be run until fully paid. Forms close MONDAY NOON before each issue date.

THE OIL AND GAS JOURNAL
Tulsa, Oklahoma

REFINERY EQUIPMENT—TOWERS—HOT OIL PUMPS
BUBBLE TOWERS—STABILIZERS—ABSORBERS—GRAY TOWERS

3′ to 8′ Diameter x 24′ to 74′ Height x ¼″ to ¾″ Shell Thickness, Riveted and Welded Reaction Chambers, 4″ and 5 3/16″ Thick, 4′ x 44′ and 5′ x 45′

3—24″ x 5″ x 24″ Worthington Hot Oil Pumps, Completely Reconditioned

SONKEN-GALAMBA SUPPLY COMPANY

W. C. Berry or H. J. Galamba
Riverview at Second, Kansas City, Kansas

Robt. W. Duden
2100 S. Union, Tulsa, Oklahoma

ALL OR ANY PART—COMPLETE 2000 BBL. REFINERY

Bubble Tower 5′x52′x⅜″ — 21 Trays With Caps Chrome Alloy — 2000 bbl. Pipe Still, 2½″ ID x 2 15/16″ OD x 20′ Tubes Alloy Headers — 8 Heat Exchangers, 255 sq. ft. ea. All New Tubes — Complete Copper Sweetening Unit — New Carload Ethyl Plant — 47 Storage Tanks from 500 to 15000 bbl. cap. — 30 Pumps All Types — Valves — Fittings — Pipe — 5 Transport Trucks Good Tires.

THE PLAINS OIL & REFINING CORPORATION
GREAT BEND, KANSAS

OIL TRANSPORTS

4—Diamond T tractors, 10 wheels, good tires. Capacity 77 bbls. each.

SONKEN-GALAMBA SUPPLY CO.
TULSA, OKLAHOMA

25 K.W. and 40 K.W. Gas Engines, 220 volts, D.C. Two 100 K.W. Gas Engine-Generator Sets, 220 volts, D.C. 7x6 Ingersoll-Rand ER-1 Air Compressor. Six-inch Oster Pipe Threading Machine. Also large stock of lathes, pipe machines, milling machines, etc. Send for our list.
Terms to suit.
CINCINNATI MACHINERY & SUPPLY CO.
26 West 2nd St., Cincinnati, Ohio

FOR SALE: 1—25 HP Westinghouse Sleeve Bearing Weatherproof type "CS" Electric Oil Well Pumping Motor, Serial #1134267; Class 3553; 3-phase; 60 cycle; 220/440 volt, 1150 R.P.M. Practically new. Box 390, Blackwell, Oklahoma.

FOR SALE
35 H.P. Superior Gas Engine and 16 foot Band Wheel Power. Condition A-1. The Geo. McGinley Supply Co., Bowling Green, Kentucky.

FOR SALE: 110 HP Int. Motor PA-100. Full equipment. Almost new. A-1 condition. $1700 f.o.b. Salem. Box 278, Salem, Ill.

FOR SALE at Oklahoma City: 1—100 H.P. Kewanee 200# W.P. oil field type boiler. Patridge, Cities Service Oil Co., Bartlesville, Okla.

FOR SALE: Bucyrus Armstrong all steel, cable tool, drilling machine mounted on truck. Good condition. Philo Dempsey, Roosevelt, Okla.

FOR SALE at Bartlesville: 1 model 1312 photostat machine. Complete $750. Patridge, Cities Service Oil Co., Bartlesville, Okla.

FOR SALE: At Oklahoma City, 2 85-HP, 175 lb. Oil Field Type Boilers, just shopped, $850.00 each. H. D. Patridge, Cities Service Oil Co., Bartlesville, Okla.

FOR SALE: COMPRESSOR UNITS near Crane, Texas: 3—90 H.P. Clark tandem 2-stage gas engine compressors and 3—Vertical 100 H.P. Model T-37 Clark gas engines direct connected to Vertical 2-stage Clark compressors. Cities Service Oil Company (Pennsylvania), Houston, Texas.

50-KW, GENERATOR, NEW—Westinghouse, 1200 RPM, 60-cycle, 3-phase, 240-volt, with switchboard and voltage regulator. Prompt delivery. Southwest Equipment Company—Dallas, Texas.

FOR SALE: 1 Motor driven rotary drilling rig; suitable for 6,000 ft. work. Melton Supply Co., Seminole, Oklahoma.

FOR SALE: 1 Askenia Type Magnetometer #7970, $750.00. Cities Service Oil Co., Bartlesville, Okla.—H. D. Patridge.

NEW POWER UNITS
Four Caterpillar gasoline motors, new, 75 H.P. complete with governors, master clutch, carburetor, and magneto, not mounted, suitable for power unit; $395.00 each. O. C. Evans, Mt. Sterling, Ky.

FOR SALE: Wilson-Mogul Drawworks with water cooled brakes and 100 H.P. International Motor. Melton Supply Co., Seminole, Oklahoma.

REFINERY TOWERS
From
RODESSA REFINERY, SHREVEPORT, LA.

1—CRACKING CHAMBER—6′0″ x 65′ 4¼″ overall, self-supporting. Head and shell thickness 1 11/16″. Quadruple riveted, double strap butt joints. Seams and rivets welded inside and outside.
1—BUBBLE TOWER—6′ 0″ x 56′ 4¾″, self-supporting. 19 trays, first four trays have 18-8 stainless steel caps. All remaining trays have cast iron caps. Head thickness, 1⅞″. Shell 1⅝″. Quadruple riveted, double strap butt joint. Seams and rivets welded inside and outside.
1—VAPORIZER—6′0″ x 34′0″ overall, self-supporting. Head thickness 1 11/16″. Shell thickness 1⅝″. Quadruple riveted, double strap butt joint. All seams and rivets welded inside and outside.

ALSO AVAILABLE FOR IMMEDIATE DELIVERY:
3½″ OD Alloy cracking tubes, Series 7000 K4B Key headers, Pumps, Valves, Fittings, Refinery Specialties, Fractionating Towers and Absorbers.

WE SOLICIT YOUR INQUIRIES FOR ALL REFINERY EQUIPMENT

BROWN-STRAUSS CORPORATION

At (Cedar Grove) Shreveport, La.
Phone 7-7334
Morton I. Glass, Resident Engineer

Main Office: Kansas City, Mo.
LD. Phone 189
Harry B. Strauss, Manager

FOR SALE

20,000′ 12¾″ O.D. lapweld pipe.
5,000′ 7″, 24 lb. seamless casing.
5,000′ 2½″ seamless upset tubing.
300 sets 3″ tool joints, full hole.
200 sets 3″ full hole tool joints.

Both steam and power drilling rig. A complete line of drilling and pumping equipment.

Wire, write, or phone the

Louisiana Iron & Supply Company
Shreveport, Louisiana

FOR SALE: At Bartlesville, two 40-gallon Soda and Acid "Ajax" Fire Extinguishers mounted on wood wheels. Patridge, Cities Service Oil Co., Bartlesville, Okla.

FOR SALE: 2000′ used 10′ "N" rods. 2000′ used 20′ "N" rods. 1500′ used "PK" rods. Hoisting plugs, pup joints, subs, etc. All A-1 shape. Box A-950, The Oil and Gas Journal, Tulsa, Okla.

FOR SALE: Near Sasakwa, Okla., 1 Cooper Gas Engine, Type G-40, 400-HP, with or without Compressor Cylinders. Patridge, Cities Service Oil Co., Bartlesville, Okla.

BOILERS: 3—520 HP 180# WP. Water Tube Type, ERIE CITY 2-Drum, Nat'l Board ASME CODE Built in 1925 in service short time, 378—3″ tubes each dismantled.
5—90 HP 150# WP Locomotive Type Full open fire box Nat'l Board ASME CODE Mass Std built by Johnston Bros Ferrysburg, Mich. in 1929 light service. 139—2¼″ x 9′ tubes each.
Large stock good used Boiler Tubes all sizes.
ARIZONA WELDING WORKS
120 S. 4th Ave., Pheonix, Ariz.

FOR SALE: 1 Southwest Gasoline Distillation Unit, complete; Type 25; Shipping Weight, 34,000 lbs. Double Eagle Refg. Co., D. L. Kelly, Oklahoma City, Tel. 2-9070.

500—GOOD used 2″ Return Bends Standard 125 lb. Screw End close, open and special wide pattern. Large stock dependable used all sizes fittings, swadge nipples, valves. Inquiries solicited. Central Pipe & Supply Co., P.O. Box 1442, Lubbock, Texas.

I have sold second-hand alloyed once run Okla City Sucker rods to the largest independent oil producers in Kansas, Okla. & Texas, five producers have bought from 50 to 300,000 ft. all with good results. I am subject to call at anytime. I will dispose of the balance of ¾″, ⅞″ & 1″ in truck load lots delivered to your location on 60 days trial, for about half of new price. Your use subject to the approval of my engineer. Can also be used for pull rods. Six each 2½″ Guiberson tubing catchers and 7″ sucker rod overshots.

MIKE TRAVIS
1702 S. Boulder Tulsa, Okla.
Phone 2-2447

HAVE remaining only 2500 feet 20″ O.D., ⅜″ Wall .35-.45 Carbon Steel Pipe P.E. in 50 ft. length good for low pressure line. Also Quantity Dresser Couplings, Ells and Valves. Subject to prior sale.
WRITE — WIRE — OR PHONE
BROWN-STRAUSS CORPORATION
Kansas City, Missouri.

FOR SALE: Near Barnsdall, Okla., 8 Safety Pulling Machines, $25.00 each. Patridge, Cities Service Oil, Bartlesville, Okla.

IMPROVED N Sullivan Core Drill, good condition; priced to sell. Healdton Machine Tool Co., Healdton, Okla.

FOR SALE: THE FOLLOWING ITEMS OF REFINERY EQUIPMENT

One—Byron Jackson centrifugal hot oil pump, serial #137023, size 3 x 9, 10-stage, connected to Terry exhaust steam turbine, complete with all valves and fittings including governor.
One—Byron Jackson centrifugal hot oil pump, serial #137022, size 3 x 9, 10-stage, connected to Terry exhaust steam turbine, complete with base and all valves and fittings including turbine governor.
One—New, stabilizer column, 36″ O.D. x 44′-6″ shell, plus 4′-0″ skirt. Shell ½″ thick. Heads ¾″ thick. Skirt ⅜″ thick.
One—New, 200 sq. ft. stabilizer reboiler. Shell size 25″ O.D. x 18′-6″ long, ⅜″ thick, shell 7/16″. 7/16″ thick heads. Heating bundle 48-1″ O.D. x 14 gauge seals. Steel tubes 16′ long.
Also many other items of Refinery equipment, including Chrome Alloy Key Headers and Chrome still tubes, various sizes. Instruments, pumps and Crosby relief valves.
For further information and prices call or write T. M. Lumly, 7419 Franklin St., Forest Park, Ill. Phone Austin-4300.

FOR SALE: Hedges-Walsh-Weidner-Scotch Marine Type Boilers, Complete. 6—150 H.P. 150# W.P. New Style API Code. 5—100 H.P. 150# W.P. New Style API Code. Bourland Supply Co., Pampa, Texas. Tel. 355.

FOR SALE
OIL STORAGE TANKS
IN GOOD CONDITION

3—5,000 Bbl.
3—2,500 Bbl.
1—1,000 Bbl.
2— 600 Bbl.
1— 100 Bbl.
2—1,200 Bbl. Agitators (prac. new)

Can be inspected at Middlesex Refinery Company, Raritan, N. J.

Address Your Inquiries to

Dulien Steel Prod., Inc.
2280 Woolworth Bldg.
NEW YORK CITY, N. Y.
TELE. CORT. 7-4676

ONE portable rig, dual motor, complete, good for 2000 ft. 1300 ft. 2½″ drill pipe. Hughes Acme Tool Joints. Sutter Well Works, Pass Christian, Miss.

FOR SALE: 55,000 barrel all-steel, bolted tank; practically new, immediate delivery; located central Louisiana. Call or wire H. A. Potter, 623 West Bldg., Houston, Texas.

FOR SALE OR LEASE
WAREHOUSE
Located Seminole, Texas, suitable for oil field use. 24′ x 42′ portable steel with living quarters.
THE GUIBERSON CORP., Box 1106
Dallas, Texas.

FOR SALE: 15,000—2″ used recessed line pipe couplings in first-class condition. Fifteen cents each in quantities. The Interstate Pipe & Supply Company, Marietta, Ohio.

FOR SALE

New & Guaranteed
Power Cylinders
Pistons
Cylinder Heads
for
Gas & Oil Engines

20TH CENTURY MFG. & SUPPLY CO.
1600 South Phoenix, Tulsa, Okla.

Journalisms:

ANOTHER Journal associate editor has donned the uniform of the U. S. Army, and is now in Camp Roberts, California.

D. H. STORMONT
First Lieutenant, Field Artillery Reserves

D. H. Stormont, who held a reserve commission as first lieutenant in the coast artillery, was most recently in the Fort Worth, Tex., office of the Journal, where he was engaged in gathering material and preparing articles for the Engineering and Operating Section. Prior to his transfer to Fort Worth last summer, he was located at the main editorial offices in Tulsa.

Dave was graduated from the school of petroleum engineering at University of Oklahoma in 1934, and joined the Journal's staff shortly after graduation. He was married last Thanksgiving.

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EARLY forms of the April 30 issue, now going to press, are indicative of the nature of the material we have gathered for this unusual issue. The keynote of the issue will be "Maintenance for Victory," and this theme runs throughout the entire section devoted to presenting means of making your present equipment yield maximum service. Into these 60 pages have been packed a multitude of practical suggestions for conserving all types of equipment, from meters to motors, from trucks to tanks. The issue will show how the oil industry has embraced the challenge to produce more with less.

We would be remiss indeed, if we did not give credit where credit is due for much of the material that will be presented in the Equipment Maintenance issue next week. Oil companies were invited to contribute descriptions of how they have found ways of conserving. Manufacturers were invited to tell how the items they manufacture could be made to last longer. Both groups responded most gratifyingly. To them we say, Thank You.

CALENDAR

April

AMERICAN CHEMICAL SOCIETY, 103d meeting, Memphis, Tenn., April 20-24.

AMERICAN ASSOCIATION OF PETROLEUM GEOLOGISTS, twenty-seventh annual meeting, Cosmopolitan Hotel, Denver, Colo., April 21-24.

PETROLEUM INDUSTRY ELECTRICAL ASSOCIATION, Washington-Youree Hotel, Shreveport, La., April 22-24.

INDEPENDENT PETROLEUM ASSOCIATION OF AMERICA, midyear meeting of directors, Blackstone Hotel, Fort Worth, Tex., April 23-24.

May

AMERICAN GAS ASSOCIATION, thirty-seventh annual natural-gas convention, New Orleans, La., May 4-7.

NATURAL GASOLINE ASSOCIATION OF AMERICA, Mayo Hotel, Tulsa, May 14-15.

KENTUCKY OIL AND GAS ASSOCIATION, annual midyear meeting, Lexington, Ky., May 22.

WEST TEXAS GEOLOGICAL SOCIETY, spring field trip, vicinity of El Paso, Tex., May 23-24.

NATIONAL ASSOCIATION OF PURCHASING AGENTS (oil-company buyers' group), Waldorf-Astoria Hotel, New York City, May 25-28.

SOCIETY OF AUTOMOTIVE ENGINEERS, annual summer meeting, Greenbrier Hotel, White Sulphur Springs, W. Va., May 31-June 5.

June

CANADIAN GAS ASSOCIATION, thirty-fifth annual meeting, Windsor Hotel, Montreal, Que., June 4-5.

ILLINOIS-INDIANA PETROLEUM ASSOCIATION, annual conference, combined with ILLINOIS BASIN CHAPTER, AMERICAN PETROLEUM INSTITUTE, annual meeting, Robinson, Ill., June 6.

AMERICAN SOCIETY OF MECHANICAL ENGINEERS, semiannual meeting, Cleveland, Ohio, June 8-11.

AMERICAN SOCIETY OF TESTING MATERIALS, Chalfonte-Haddon Hall, Atlantic City, N. J., June 22-26.

October

NATIONAL STRIPPER WELL ASSOCIATION, annual convention, Wichita, Kans., October 12.

AMERICAN SOCIETY OF MECHANICAL ENGINEERS, fall meeting, Rochester, N. Y., October 12-14.

INDEPENDENT PETROLEUM ASSOCIATION OF AMERICA, thirteenth annual convention, Wichita, Kans., October 13-15.

NATIONAL LUBRICATING GREASE INSTITUTE, tenth annual meeting, New Orleans, La., October 25-29.

ILLINOIS MINERAL INDUSTRIES CONFERENCE, Campus, University of Illinois, Urbana, Ill., October 30-31.

November

AMERICAN PETROLEUM INSTITUTE, twenty third annual meeting, Stevens Hotel, Chicago, Ill., November 9-13.

NATIONAL CHEMICAL EXPOSITION AND NATIONAL INDUSTRIAL CHEMICAL CONFERENCE, annual meeting, Stevens Hotel, Chicago, Ill., November 17-22.

December

AMERICAN SOCIETY OF MECHANICAL ENGINEERS, annual meeting, New York City, November 30-December 4.

ADVERTISERS IN THIS ISSUE

American Rolling Mill Co. 93
Axelson Manufacturing Company 99
B. & W., Inc. 8
Baroid Sales Division, National Lead Company 13
Bethlehem Supply Company 1
Cameron Iron Works, Inc. ..... Inside Back Cover
Cardwell Mfg. Co., Inc. 2
Caterpillar Tractor Co. 15
Century Electric Company 5
Chapman Valve Mfg. Co., The 76
Classified Advertising 110-111
Continental Motors Corp. 6
Continental Supply Company, The 35
Cooper, Fred E. 16
Cooper-Bessemer Corp., The 31
Coppus Engineering Corp. 3
Core Laboratories, Inc. 29
Darling Valve Mfg. Co. 9
DeGolyer, MacNaughton and McGhee 58
Dresser Mfg. Co., The 83
Drilling Equipment Directory 84
Dugas Engineering Corp. 81
Ethyl Corporation 4
First National Bank & Trust Co. of Tulsa, The 91
Fisher Governor Company 18
Franks Mfg. Co. 102
General American Transportation Corporation—Terminal Division 8
General Geophysical Co. 48D
General Paint Corporation 94
Girdler Corporation, The 36
Halliburton Oil Well Cementing Co. ..... Inside Front Cover
Harrison Equipment Co. 59
Hill-Hubbell & Co. 94
Hughes Tool Co. ..... Back Cover
Lamtex Equipment Corp. 100
Lane-Wells Company 42
Levorsen, A. I. 59
Marmon-Herrington Co., Inc. 60
National Geophysical Co. 52
Page Steel & Wire Division of American Chain & Cable Co. 10
Peerless Pump Division of Food Machinery Corp. 102
Penberthy Injector Co. 39
Pike & Co., E. W. 59
Reading, Pratt & Cady Division of American Chain & Cable Co. 7
Rector Well Equipment Co., Inc. 103
Reed Roller Bit Company 64
Republic Steel Corporation 12
Ross, J. K. 100
Schlumberger Well Surveying Corporation 47
Seismic Explorations, Inc. 50
Seismograph Service Corp. 48A
Shell Oil Company, Incorporated 11
Texaco Development Corporation 74
Timken Roller Bearing Company ..... Front Cover
Tulsa Camera Record Co. 59
Universal Oil Products Co. 32
Viking Pump Co. 98
Wall-Colmonoy Corp. 63
Western Geophysical Company 54
Wilson, Web, Oil Tools 103